REPORT RESUMES

ED 003 140 64

A SURVEY OF TELEVISION EQUIPMENT AND FACILITIES USED FOR PURPOSES OF INSTRUCTION BY PUBLIC SCHOOLS, COLLEGES, AND UNIVERSITIES.

BY- BRUGGER, JOHN R. AND OTHERS
WASHINGTON COUNTY BOARD OF EDUC., HAGERSTOWN, MD.
REPORT NUMBER NDEA-VIIB-004 PUB DATE 60
CONTRACT OEC-SAE-8347
EDRS PRICE MF-$0.45 HC-$11.40 285P.

DESCRIPTORS- SURVEYS, *TELEVISION RESEARCH, *TELEVISION SURVEYS, *TELEVISED INSTRUCTION, TELEVISION, BROADCAST TELEVISION, CLOSED CIRCUIT TELEVISION, EDUCATIONAL TELEVISION, OPEN CIRCUIT TELEVISION, KINESCOPE RECORDINGS, PRODUCTION TECHNIQUES, TELEVISION LIGHTING, TELEVISION TEACHING, EQUIPMENT, *BROADCAST RECEPTION EQUIPMENT, EDUCATIONAL EQUIPMENT, *EQUIPMENT STANDARDS, SCHOOLS, COLLEGES, VIDEO TAPE RECORDINGS, HAGERSTOWN, MARYLAND

AN EXTENSIVE SURVEY WAS MADE OF EDUCATIONAL TELEVISION EQUIPMENT AND FACILITIES USED BY PUBLIC SCHOOLS, COLLEGES, AND UNIVERSITIES. A CRITIQUE IS INCLUDED IN THE SURVEY REPORT DESCRIBING HOW EFFECTIVE 56 INSTITUTIONS ARE IN USING THE MEDIUM. NEAR THE END OF THE STUDY, A CONFERENCE WAS HELD (1960) AT HAGERSTOWN, MARYLAND, TO DRAW UPON PROFESSIONAL KNOWLEDGE AND EXPERIENCE OF WELL-KNOWN EXPERTS IN THE FIELD OF EDUCATIONAL TELEVISION. THE REPORT INCLUDES A COMPLETE TEXT OF THE CONFERENCE TRANSCRIBED FROM A TAPE RECORDING. ALSO INCLUDED IN THE REPORT ARE RECOMMENDED STANDARDS FOR KINESCOPE RECORDINGS, TELEVISION STUDIO EQUIPMENT AND VIDEOTAPE RECORDINGS, AND A LISTING OF MANUFACTURERS OF TELEVISION EQUIPMENT. THE STUDY HAS BROUGHT TOGETHER THE VARIOUS ELEMENTS RELATING TO A TELEVISION OPERATION--THE EQUIPMENT, METHODS, AND PERSONNEL. (JC)

B-004

Contract O. E. #SAE8347

U. S. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE
Office of Education
This document has been reproduced exactly as received from the person or organization originating it. Points of view or opinions stated do not necessarily represent official Office of Education position or policy.

CONTRACT FOR DISSEMINATION ACTIVITIES

PURSUANT TO PUBLIC LAW 85-864

between

THE UNITED STATES OF AMERICA
Department of Health, Education
and Welfare; Office of Education
Washington 25, D.C.

and

THE BOARD OF EDUCATION OF WASHINGTON COUNTY
Dr. Wm. M. Brish, Superintendent
Hagerstown, Maryland

TITLE

A SURVEY OF TELEVISION EQUIPMENT AND FACILITIES USED FOR PURPOSES OF INSTRUCTION BY PUBLIC SCHOOLS, COLLEGES AND UNIVERSITIES

By

Mr. John R. Brugger (Project Director)
Chief Engineer
Board of Education, Washington County
Hagerstown, Maryland

The (research) (survey) (dissemination activities) reported herein were performed pursuant to a contract with the United States Office of Education, Department of Health, Education and Welfare.

ED003140

CONTENTS

Acknowledgements 2
Analysis of Survey 5
Broadcast Station Planning 7 - 12
Camera design improvements 63
Color equipment 54
Contracts, leases 64
Distribution Systems 6
    Closed-circuit 28 - 31, 63
    Micro wave 33
    Open-circuit 7 - 12
    Satellite, translator 21 - 27
Environmental control 68, 69
Equipment requirements 62
Establishing a TV operation 63
Evaluation and utilization of TV 66, 75
Finances 65, 66
Frequency conservation 64
Holding attention of viewer 73
Introduction 3
Leasing services 64, 66
Lighting 39–49
New equipment designs
Personnel 74
    Classroom teacher 64, 65, 69, 70, 71
    Communication specialists 60
    Graphic Artists 50
    Studio Teachers 57
    Technical 56
    Workload 72, 73
Projected plans 67, 68
Purpose of Survey 3
Receivers 33
    Design 63
    Selection 33, 35
Recorders
    Film 54, 71, 72
    Tape 21 - 27
Scheduling TV 69
Studios
    Centralized 36
    Decentralized 36
    Equipment 52 - 53
    Size 36
Table of organization 73
Tape recording 71, 72
Teaching
    Direct 72
    Supplementary 72
Teaching machines 64
Terminology in ETV 75
TV systems 55
Two way communication 31, 64

LIST OF ILLUSTRATIONS

	Page
Planning for ETV	6A
A Science Demonstration via Television	33A
A Flexible Mobile TV Equipment	38A
A Professional Television Studio	38B
The Television System Components	52A
Methods of Originating & Distributing Simultaneous Programming	55A
A Mobile Studio for Versatility	55B
Preparing for a Telecast	58A
Preparation of Graphic Art Material	60A

LIST OF FIGURES

System Diagram for ETV Rebroadcast System	24
Simplified 6 Channel Radio Frequency TV System	29
Washington County Maryland Closed-circuit TV System	32
The Effect of Average Scene Brightness on Lens Opening and Picture Quality	39
Lens Depth of Field Chart	41

LIST OF TABLES

VHF Transmitter, Antenna & Operating Costs - Channels 2 & 3	13
VHF Transmitter, Antenna & Operating Costs - Channels 4, 5, 6	14
VHF Transmitter, Antenna & Operating Costs - Channels 7 to 13	15
UHF Transmitter, Antenna & Operating Costs	16
VHF Channels 2, 3	17
VHF Channels 4, 5, 6	18
VHF Channels 7 to 13	19
Various Antenna Heights & ERP Versus Coverage	20
TV Studio Equipment & Operating Costs	38
Lighting Equipment Costs for Standard Lighting Practices	
Studio sizes 18' X 25', 20' X 30', 25' X 40'	46
Studio sizes 30' X 50', 40' X 60', 50' X 75'	47
General Lighting Techniques & Procedures for Monochrome Operation	48 & 49

ACKNOWLEDGEMENTS

The information collected and described in this survey was made possible by the kind cooperation of personnel representing institutions and professional organizations visited and also those who responded so generously through correspondence in supplying data requested. The Director wishes to thank all of these people who have collaborated in the process of assembling this compendium.

The Director is also indebted to Dr. William M. Brish, Superintendent of the Washington County, Maryland, Schools, Messrs. Edward C. Kercheval, Robert F. Lesher, Clyde H. Roberts, and others of the professional staff of the Washington County, Maryland, Board of Education who were so generous with their assistance in preparing sections of this report. The Director wishes to express sincere gratitude to the consultants who served with the Director in correlating the definitive and objective data used in the organization and corroboration of the findings.

An acknowledgement is also expressed for the assistance received from Members of the Electronic Industry Association, the Chesapeake and Potomac Telephone Company of Maryland, members of the electronic manufacturing industry and interested associated.

INTRODUCTION

Many valuable reports and summaries have been prepared by various institutions which have pioneered in the uses of television in education. These have been readily available over the past few years and have enabled educators in nearly every section of the country to familiarize themselves with television activities in educational institutions. It is a compliment to these pioneering spirited people to have been so generous with their investigations and studies to share the proceeds of their professional work with others over such wide areas. Nearly every forward looking school administrator has placed his name and institution on mailing lists to receive periodicals and prepared documents. Professional organizations such as the National Education Association (NEA), the National Association of Educational Broadcasters (NAEB), the Joint Council on Educational Television (JCET), the Fund for the Advancement of Education (FAE, a nonprofit corporation established by the Ford Foundation), members of the Electronic Industry Association, individual representatives from industry, the United States Office of Education (USOE), and, likewise, many others have been keenly interested and helpful in disseminating reports and other pertinent facts concerning the development of television in the field of education.

Emphasis is currently being placed on the mass media. This should be anticipated in view of the fact that ours is a fast changing and rapidly populating world. The power of the mass media affords the moral persuasion in producing an affluent and enlightened society. The many complications of international as well as domestic affairs require very rapid communication systems as a matter of survival. Television has a contribution to make in serving educational processes toward a better understanding of problems of the world in which we live.

PROBLEM

Study the television equipment and facilities used for purposes of instruction by public schools, colleges and universities.

1. What are the steps leading toward the establishment of an educational television operation?

2. Describe what is needed in terms of

    a. Present equipment.
    b. New design of equipment.
    c. Physical (studio and administrative) space requirements.
    d. Two-way communication systems.
    e. Staff requirements.
    f. Finances.
    g. Evaluation and utilization.
    h. Leasing equipment and services.

3. Is the current use of television equipment (in education) in line with the manufactured product design?

4. What are some projected plans for uses of Educational Television?
5. Describe area, state, regional and national networks.
6. What environmental factors should be considered in viewing rooms and studio areas?
7. What are the (equipment) problems of scheduling programs for a large number of schools?
8. What are classroom teacher and student reactions to instruction by television?
9. What are some problems concerned with supplementary versus direct instruction?
10. What makes television instruction worthwhile and how do you test and evaluate results?
11. What is considered a work load for a television teacher?
12. What can televised instruction do beyond classroom instruction?
13. How is the audience captured and held?
14. Design the table of organization for an educational television operation. Should it be attached to a department or operate independently?
15. What might colleges and universities do toward providing training for personnel in various capacities for work in educational television?
16. What are some common problems concerned with

    a. Technical facilities
    b. Staff
    c. Finances
    d. Evaluation

17. How are educational institutions thriving on grantless programs?
18. Describe television as a communication medium.
19. Where are we in educational television? Where are we going? Where should we be now?
20. What about nomenclature for educational television?

An accumulation of data pertaining to educational institutions using television, a study of the challenges of this contract, an exchange of ideas and interests with professional people working in the media and an analysis of areas to be tested preceded the development of a schedule of vital information which was to assist in the selection of data and provide the essence of this report. The collection of data was accomplished by (1) on-site visits by the Director of the project to institutions using television in education, (2) a study of professional reports issued by various institutions using television actively in educational operations (some of which were not to be included in the on-site visitations), and (3) selected mailings seeking information and data relevant to the fullfillment of the contract.

Visits were made to 56 educational institutions using television. The compendium of detailed information compiled indicated certain trends and practices. In order to further corroborate and enlarge upon these findings, a conference was held whereby a number of professional people were brought together to discuss, investigate and evaluate current developments and project a perspective state of the art of television in education (See Appendix A). This group was selected to provide (1) a representative cross section of diversified television operations, (2) a wide scope of experiences in institutional administrative policies, practices, and activities, as well as professional and technical training, and (3) professionals from the field who have association with television and appropriate interest in education and affiliation organizations.

This document presents a body of information and technical data which describes the current "state of the television arts" in education. Recommendations of methods of procedure, areas suggested for further research and reactions of the Director to pertinent operational considerations are included.

ANALYSIS

The revolutionary or evolutionary methods in education have been complicated by the technological developments of the electronic era. Television is but one of the scientific advances which is currently being tested in education to learn of the potential it offers.

The use of television by an educational institution presents a number of problems. These are (1) a plan for manageable, productive and profitable use of television, (2) long range planning for continuous and effective use of the medium, (3) a method of measuring and evaluating the results achieved and (4) a systematic method of absorbing the financial burden. These must be studied carefully since these control, to a large extent, the educational benefits derived by an institution from the use of television. These are difficult to organize and frequently require compromises. Current knowledge, practices and skills dictate procedures for more prudent choices in the developmental process. It has become prevalent for administrators to select influential members of their staff to include many resources of the institution in the planning stages. Programming plans must be conceived, studied and projected into a pattern which should be developed through progressive stages over an extended period of time, starting with the simple and expanding to the more complex. Such a procedure provides strength and growth during the entire development through experience, knowledge and efficiency in administration, the educational process, the training of personnel and utilization of the technical facility.

The initial step in setting up an operation should include the review of illustrative materials prepared by other institutions using television as well as an analysis of the potential services television would render their institution. Visits to on-going operations provide familiarzation with techniques, costs, attributes and difficulties which are likely to be encountered.[1] Personal contacts with people working with television afford much first-hand information. The major program services television provides may be summarized as follows:

1. A distribution system for recorded materials (film and/or video tape).
2. An observation device for teacher (in-service) education, student observation, presentation of demonstration methods, principles or materials, etc., or alternate combinations of these.

---

[1] Philip Lewis, Educational Television Guidebook.

3. For laboratory exercises in professional curricula to give experience and practice in television and related communication media.
4. Direct or supplementary teaching through discriminate use of resource materials and personnel.
5. An administrative communication device (dissemination of information, directives, announcements, etc.).
6. Inter and/or intra institutional (network) communication system(s).[1]
7. A means to communicate from a remote origination to central area (or vice versa) for broad distribution (or delayed use through facilities for recording via film and tape).
8. Immediacy needed in medical and dental diagnosis (and treatment).
9. Develop learning habits (through school use of television) by students to improve their use of the medium in later life (from educational television programs).

It is sufficient to relate that the technical facility must be so planned and designed to permit flexibility and utility during the entire phase of an institution's development of television. This is a basic requirement and is accomplished very effectively with skillful planning. See ILLUSTRATION 1.

Following pre-planning sessions, it is recommended that consultant teams assist the institutional representatives in establishing the prescribed processes. Such problems as the following should be considered:

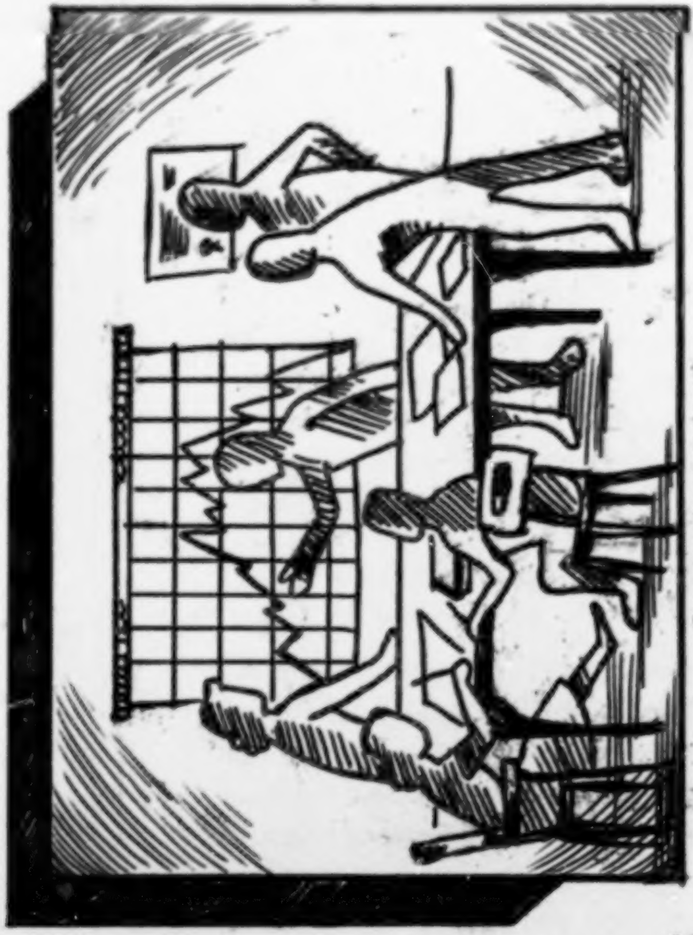
1. A study and investigation to determine how television can profitably serve various areas in the institution, commencing with a relatively simple requirement and expanding over a period of time, ultimately to reach a predetermined full program schedule.
2. A study and investigation of the audience to be served. This requires competent engineers to study the most feasible method of transmission. Open-circuit and/or closed-circuit distribution systems may be used to reach the audience prescribed in the programming plans. The capital investment necessary to develop the physical plant which will accommodate the immediate and future requirements should be studied including the merits of ownership or leasing of facilities.
3. An analysis of developmental, operational and sustaining costs for maintaining an efficient operation.
4. A break down of the costs of developmental stages with optional plans (including amortization) to provide the maximum practical flexibility in making administrative decisions.
5. A systemized evaluation program to measure and evaluate the educational goals achieved.

DISTRIBUTION SYSTEMS

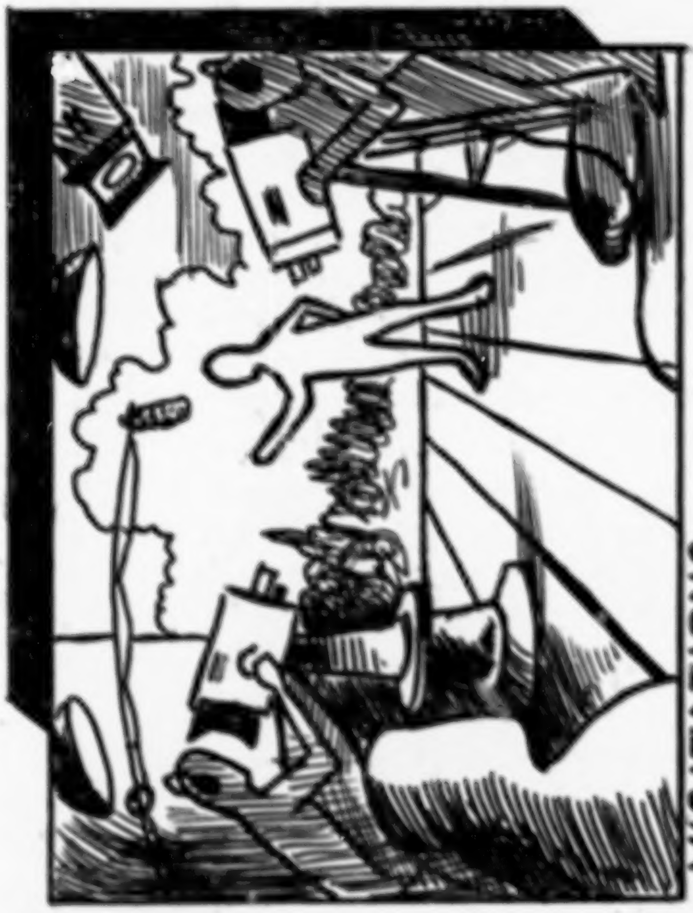
Two general classifications denote types of distribution for television systems, open-circuit and closed-circuit. Open-circuit refers to broadcast stations which may be either Very High Frequency (VHF) or Ultra High Frequency (UHF). Availability of

---

[1] The Feasibility and Role of State and Regional Network in Educational Broadcasting, pp 43-206, September 9-11, 1959.

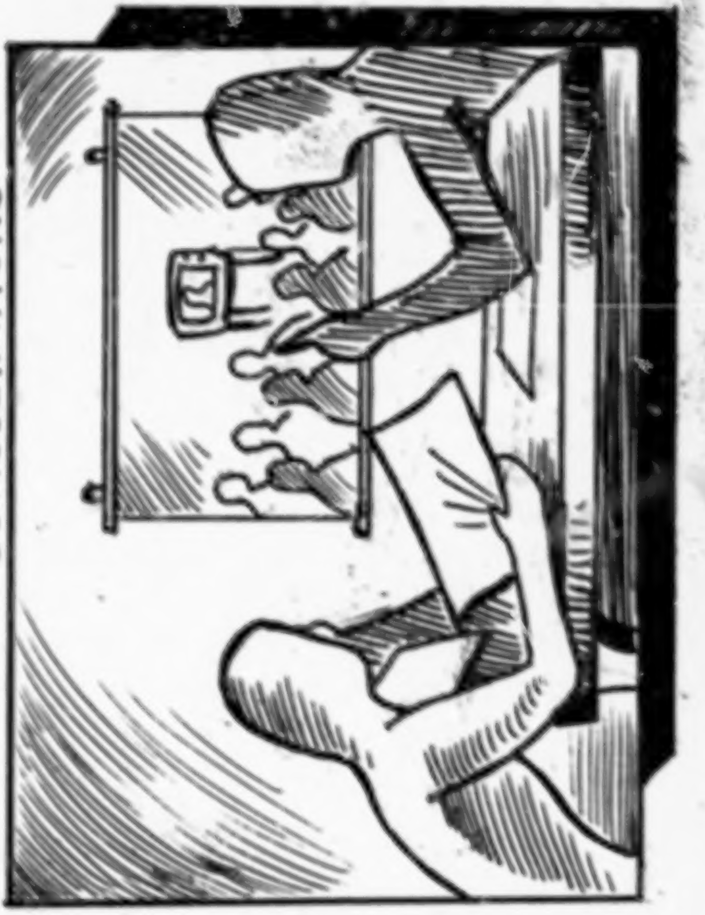


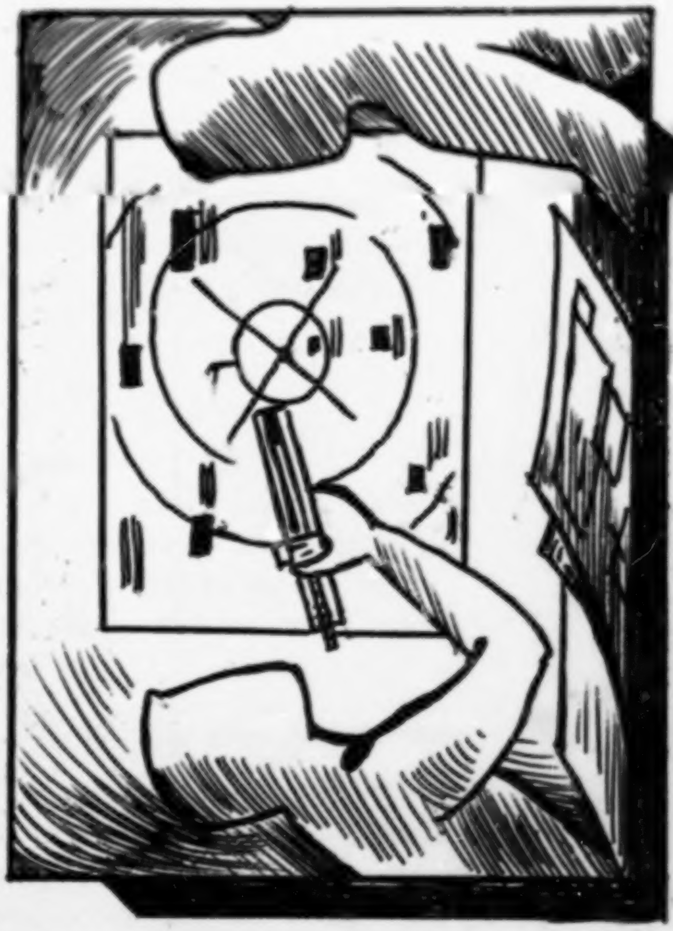
PLANNING



VISITATIONS

CONSULTATIONS





TECHNICAL ADVICE

6A

ILLUSTRATION 1

the various channels for each community throughout the United States is summarized in a Federal Communications Commission (FCC) Volume titled "Rules and Regulations," Volume II, Part 2 and Volume III, Part 3, Part 4. These are available from the Superintendent of Documents, Washington, D. C., and include Frequency Allocations and Radio Treaty Matters, and General Rules, Regulations and other pertinent data relative to broadcasting for interested applicants. These include Radio Broadcast Services, Experimental, Auxiliary and Special Broadcast Services. Closed-circuit refers to coaxial circuit systems or microwave installations.

Open-circuit or broadcast stations offer the following services:

1. A single broadcast station to reach a potential audience which is described as the service area of the station. This is a function of the channel frequency, power of transmitter, efficiency of the transmission line, height of the radiating element, gain of the antenna and topography of the area.
2. Additional or multiple broadcast transmitters.
3. Television booster station(s).
4. Television satellite and/or translator stations.
5. Drop in (VHF) service.

Planning a broadcast station operation requires a review of programming plans, financial requirements and service areas to be reached. Much of this information is required as a part of the formal application to the FCC.

The following information suggests the steps to be followed and the general topics to be considered in the planning of educational television broadcast stations.

> Since local institutions differ, it is not practical to suggest a procedure applicable to all cases. It is believed, however, that these indicate a desirable basic procedure which will apply generally.[1]
>
> 1. Exploration
>
>   a. Planning of educational TV service to be provided and licensee organization to provide that service.
>
>   Licensees are usually a university, a college, a school system, or a combination of these; a state department or commission, or a nonprofit corporation consisting of local educational, civic and/or cultural organizations (in this case, the station is usually described as a "community type" station).
>
>   b. Desired coverage of station, geographic area and audience to be served.
>
>   A station may serve an educational system or systems, the general public, or both. Wide rural coverage may be desired as a part of a state system, shorter range rural coverage, for a country school system; city coverage, for a city school system, with rural coverage secondary; or small city or limited area coverage.

[1] By permission. Check List for Planning Educational Television Stations, March, 1959.

c. Channel availability.

If a high UHF channel is reserved, it may be possible to secure a lower, better UHF channel. In some instances, a VHF channel may be available instead of a UHF channel.

d. Cost estimates to provide the desired coverage.

Preliminary cost estimates may be obtained from an associated TV engineer, from a TV engineer of a local commercial station, from consulting engineers, or from TV equipment sales engineers. Catalogues and other material from manufacturers are helpful.

e. Preliminary program planning.

General agreement should be reached among participating agencies as to approximate use of time for in-school, pre-school, adult education and general interest programming.

f. Preliminary staffing plans and operating budgets.

These will necessarily depend on the amount and type of programming, the extent of studio and other equipment used, and related factors. (Personnel can sometimes be suppled by participating agencies.)

g. Probable financial support for station construction and operation.

Possible sources of support are: educational institutions and organizations (for example, participating school systems on the basis of the number of pupils); other city or county governmental units; legislative appropriations; civic and cultural organizations; public fund drives, business firms; foundations.

h. Appointment of a competent key person or small committee to be responsible for station planning and coordination of efforts.

The success of the project often hinges on this point.

2. Planning

a. FCC Requirements

The following materials are available without charge from the Federal Communications Commission, Washington 25, D. C., and are needed to guide your planning: Information bulletin, "Broadcast Application Procedure"; the FCC's "List of Printed Publications"; and six copies of broadcast application Form No. 301, or more if needed.

Other important information is contained in Part 1 of the FCC Rules (25¢) and Part 3 of the FCC Rules ($1.50); these must be ordered, with payment enclosed, from the Government Printing Office, Washington 25, D. C. Note: The FCC "List of Printed

Publications" to be requested directly from the FCC shows other rules and publications that may also be desired, and how they may be obtained.

b. Formal organization of group to be the station licensee, if required.

If the station is to be of the community type, a nonprofit corporation should be formed to operate the ETV station. Any necessary agreements between licensee organizations should be made. In any event, whether the station is to be licensed to an agency that already exists, to a combination of organizations, or to a corporation created for the purpose, statute authority to engage in broadcasting should be clear; a legal interpretation of existing law indicating such authority may be adequate.

c. Program planning

The general phases of programming agreed upon can now be made more specific, and the participating agencies, if any, can begin making plans for their program series. An inquiry addressed to the National Educational Television and Radio Center, 10 Columbus Circle, New York City 18, New York, will bring information about films and kinescopes available from them.

d. Professional assistance

A skilled TV broadcast engineer, consulting engineer, or other competent technical person is needed to plan the installation and to prepare the engineering portion of the FCC application. An attorney skilled in communications law and familiar with FCC procedures is very helpful in preparing and filing the application and in handling possible FCC questions and correspondence.

e. Engineering planning

Plans should be made for the transmitter location, including aeronautical hazard consideration; transmitter, tower and antenna to be used; studio and office location and layout; TV cameras and associated equipment, alternate or secondary studios, if desired; microwave studio-transmitter link, if required; power requirements, etc.

f. Financial plans

Financial plans should be completed to cover the cost of construction and at least one year of operation, with as much planning as possible for the subsequent years. Agreements for financial support should be expressed in writing. Financing is a most important step in overall planning.

3. Preparing and Filing the Application

a. Completion of planning

Details of station organization, construction, financing and operating should be well developed.

b. Completion and filing of application

Information called for in the application is set forth in detail in the FCC Form No. 301. Careful preparation of the application will expediate action on it. The application consists of several portions, as follows:

Section I: This section calls for a very brief summary of the facilities requested and is the section to be executed before a Notary Public by any officer of the applicant authorized to do so. It should be completed after all the other sections of the application, and must be dated later than any other section.

Section II: This section relates to the legal qualifications of the applicant. It calls for the names of the persons associated with the applicant and for the legal authority of the applicant to construct and operate the proposal educational television station.

Section III: This section relates to the financial qualifications of the applicant. Figures for the capital costs of the facilities are required, as well as operating costs for one year. The sources of the funds required for construction and operation are required to be set forth.

Section IV: Information concerning the programming of the proposed station and a description of its staff are called for in this section.

Section V-C: This section calls for detailed engineering information concerning the proposal as required by the FCC's rules relating to technical operation.

Section V-G: This section requires a description of the proposed antenna structure, which is used to determine whether the tower will constitute a hazard to air navigation.

The completed Form No. 301 should be filed with the FCC in Washington, D.C. Three copies of the entire form plus exhibits are required, but only the original copy has to be signed. The other two copies may be conformed copies. Two additional copies of Section V-G and associated exhibits are required. (Two copies of Section V-G come with each Form No. 301.)

c. Construction plans

Contracts for building and tower construction and for equipment purchase may be signed if they are made contingent on the granting of the construction permit by the FCC. Any required local permits should be obtained. Construction of the station must not begin until the FCC permit is received -- Congressional law!

d. Station staffing

In particular, the station manager, chief engineer, and program manager should be sought. Preferably these persons should be available to participate in details of station planning before the application is filed.

e. Preliminary activities

Depending upon the staff or others available, many further details involved in planning the construction and operation of the station can be handled while waiting for the construction permit to be granted.

4. Station Construction and Operation

a. Granting of the construction permit

The permit will state that construction must begin within two months and be completed within an additional six months. Extensions of time to complete construction are granted upon filing an extension application (FCC Form No. 701) having a showing of diligence and the need for additional time. These are usually granted for six month periods upon separate applications, and most television stations require at least one extension. An extension application should be filed 30 days before but no later than the expiration date of the existing permit. If the construction permit expires, an application for reinstatement (FCC Form No. 321) may be filed within 30 days; thereafter a new application (FCC Form No. 301) must be filed.

b. Modification of the construction permit

Should it be desired to change the transmitter, tower, antenna, or other major equipment from that specified in the application, an application of remodification of construction permit must be filed and granted. Form No. 301 is used, but previous information on file with the FCC can be so referred to and need not be repeated. A modified permit does not usually extend automatically the time limit for the completion of construction (see previous paragraph).

c. Station staffing

In addition to key personnel, additional staff persons can be helpful during this time. Technical personnel can participate in station construction and become familiar with TV cameras and other equipment. Program personnel can make dry runs so that initial programs will have polish.

d. Equipment and program tests

After construction is complete and before the construction permit expires, "equipment tests" on the air may be made for the purpose of tuning the transmitter and insuring that all of the equipment is operating properly. The FCC must be notified of the tests. Measurements of equipment performance are then made and submitted to the FCC with the application for license (FCC Form No. 302). Program test authority may be requested at the same time, at least 10 days before regular programming is scheduled to begin.

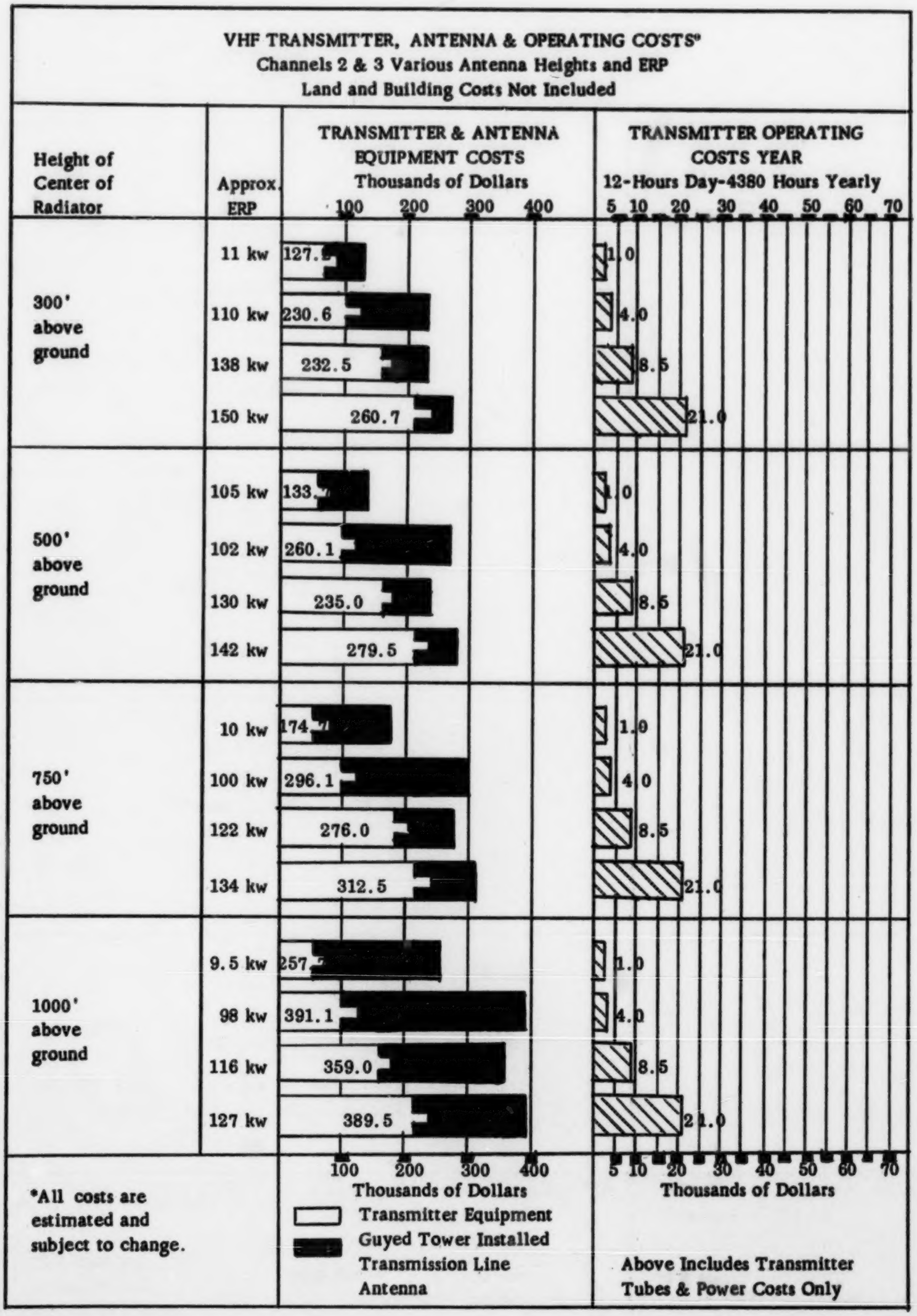
e. Programming and licensing

Following initial approval by the FCC concerning the performance data in the license application, the FCC will issue program test authority. Regular station operation and programming may then begin, in accordance with the FCC rules (in Part 3), while the FCC acts further on the license application. While this application is being considered, program test authority continues automatically. If the construction permit expires during this period, it need not be extended. Licenses are issued for three year periods, except that the initial license is usually for a shorter period because of the dates set in the rules when various renewal must be filed (FCC Form No. 303) at least 90 days before the license expires.

TABLES 1, 2, 3 and 4 illustrate relative costs to purchase and operate various open-circuit television channels. Probable coverage areas are illustrated in TABLES 5, 6, 7, and 8. The channel assignment, effective radiated power (ERP) and antenna height determine the service radius which might be anticipated. It is to be noted that studio equipment and receiving equipment is not included in the estimated costs.

Installations which include multiple broadcast transmitters, satellite transmitters or translators will add to the costs for the extra facilities. One tower may serve multiple antennas however; this may result in the requirement of a heavier tower than that proposed for the single antenna installation and would necessitate an appropriate increase in cost. As an alternate mode of operation, a number of communities find local commercial stations cooperative with educational institutions in making their facilities available to educators for limited hours during the day.

TABLE 1



VHF TRANSMITTER, ANTENNA & OPERATING COSTS*
Channels 2 & 3 Various Antenna Heights and ERP
Land and Building Costs Not Included

Height of Center of Radiator	Approx. ERP	TRANSMITTER & ANTENNA EQUIPMENT COSTS Thousands of Dollars	TRANSMITTER OPERATING COSTS YEAR 12-Hours Day-4380 Hours Yearly
300' above ground	11 kw	127.2	1.0
	110 kw	230.6	4.0
	138 kw	232.5	8.5
	150 kw	260.7	21.0
500' above ground	105 kw	133.7	1.0
	102 kw	260.1	4.0
	130 kw	235.0	8.5
	142 kw	279.5	21.0
750' above ground	10 kw	174.7	1.0
	100 kw	296.1	4.0
	122 kw	276.0	8.5
	134 kw	312.5	21.0
1000' above ground	9.5 kw	257.7	1.0
	98 kw	391.1	4.0
	116 kw	359.0	8.5
	127 kw	389.5	21.0

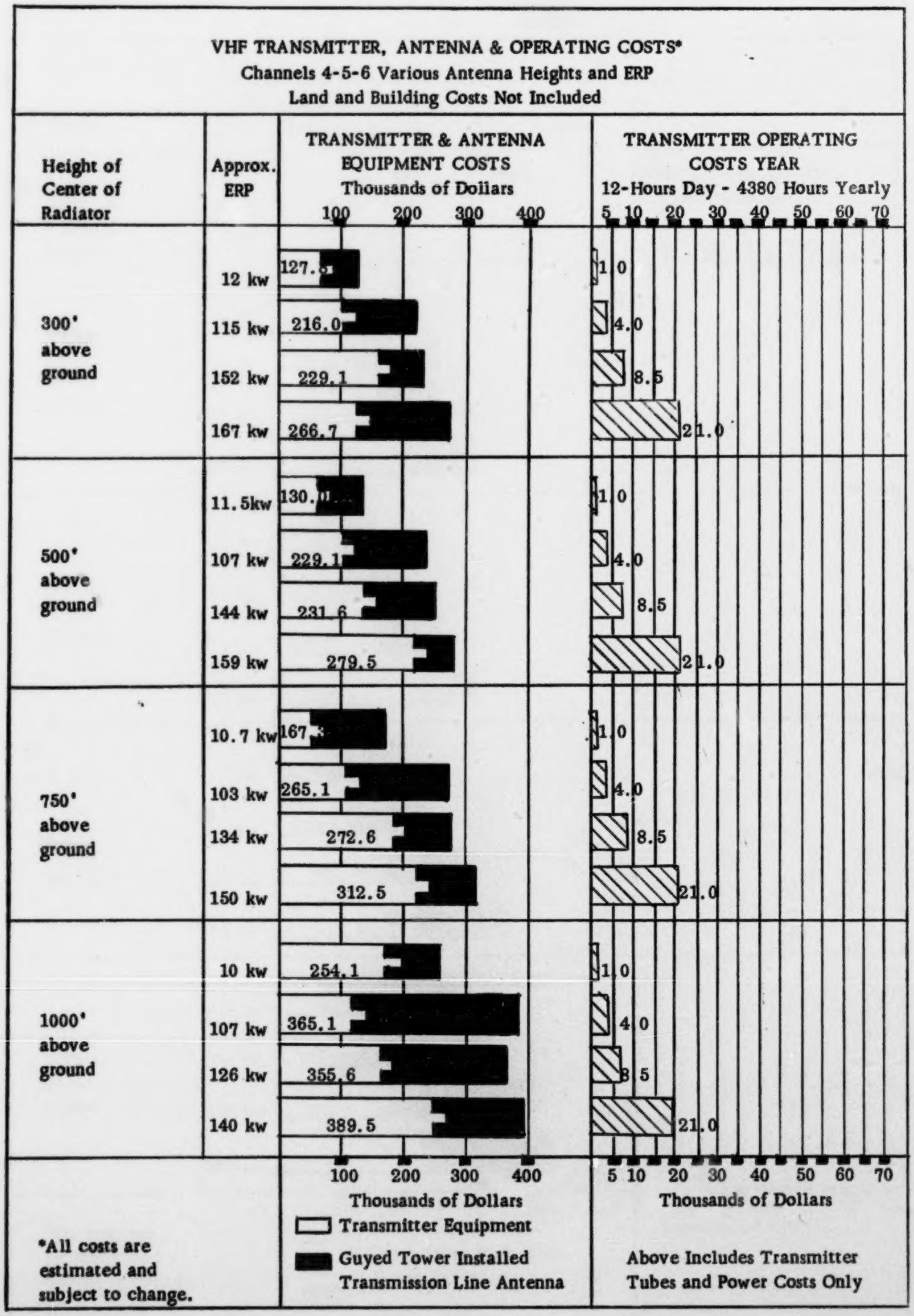
*All costs are estimated and subject to change.

☐ Transmitter Equipment

■ Guyed Tower Installed Transmission Line Antenna

Above Includes Transmitter Tubes & Power Costs Only

TABLE 2



VHF TRANSMITTER, ANTENNA & OPERATING COSTS*
Channels 4-5-6 Various Antenna Heights and ERP
Land and Building Costs Not Included

Height of Center of Radiator	Approx. ERP	TRANSMITTER & ANTENNA EQUIPMENT COSTS Thousands of Dollars	TRANSMITTER OPERATING COSTS YEAR 12-Hours Day - 4380 Hours Yearly
300' above ground	12 kw	127.5	1.0
	115 kw	216.0	4.0
	152 kw	229.1	8.5
	167 kw	266.7	21.0
500' above ground	11.5kw	130.0	1.0
	107 kw	229.1	4.0
	144 kw	231.6	8.5
	159 kw	279.5	21.0
750' above ground	10.7 kw	167.3	1.0
	103 kw	265.1	4.0
	134 kw	272.6	8.5
	150 kw	312.5	21.0
1000' above ground	10 kw	254.1	1.0
	107 kw	365.1	4.0
	126 kw	355.6	8.5
	140 kw	389.5	21.0

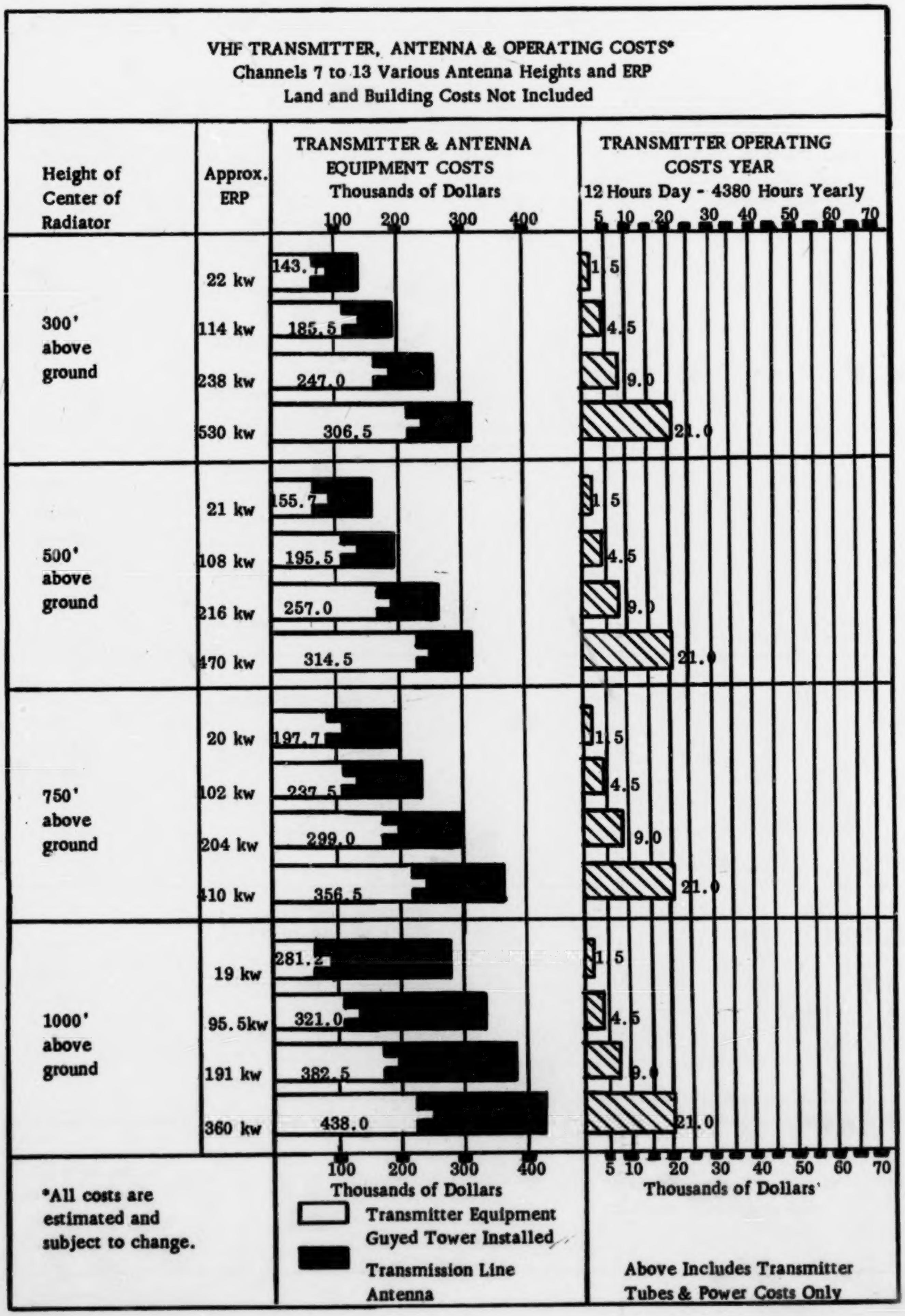
☐ Transmitter Equipment

■ Guyed Tower Installed Transmission Line Antenna

Above Includes Transmitter Tubes and Power Costs Only

*All costs are estimated and subject to change.

TABLE 3



VHF TRANSMITTER, ANTENNA & OPERATING COSTS*
Channels 7 to 13 Various Antenna Heights and ERP
Land and Building Costs Not Included

Height of Center of Radiator	Approx. ERP	TRANSMITTER & ANTENNA EQUIPMENT COSTS Thousands of Dollars	TRANSMITTER OPERATING COSTS YEAR 12 Hours Day - 4380 Hours Yearly
300' above ground	22 kw	143.7	1.5
	114 kw	185.5	4.5
	238 kw	247.0	9.0
	530 kw	306.5	21.0
500' above ground	21 kw	155.7	1.5
	108 kw	195.5	4.5
	216 kw	257.0	9.0
	470 kw	314.5	21.0
750' above ground	20 kw	197.7	1.5
	102 kw	237.5	4.5
	204 kw	299.0	9.0
	410 kw	356.5	21.0
1000' above ground	19 kw	281.2	1.5
	95.5kw	321.0	4.5
	191 kw	382.5	9.0
	360 kw	438.0	21.0

*All costs are estimated and subject to change.

☐ Transmitter Equipment
Guyed Tower Installed

■ Transmission Line
Antenna

Above Includes Transmitter Tubes & Power Costs Only

TABLE 4

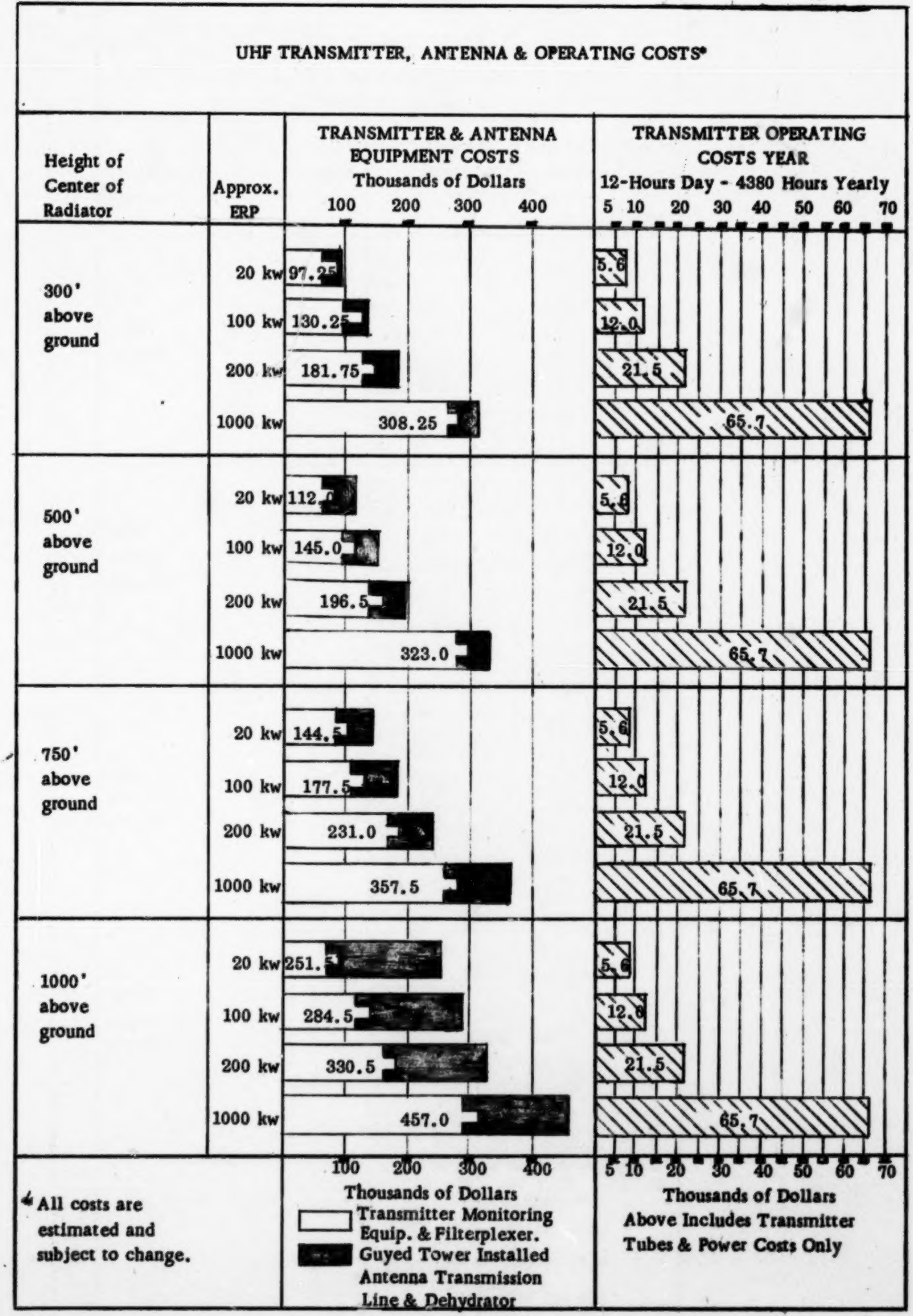
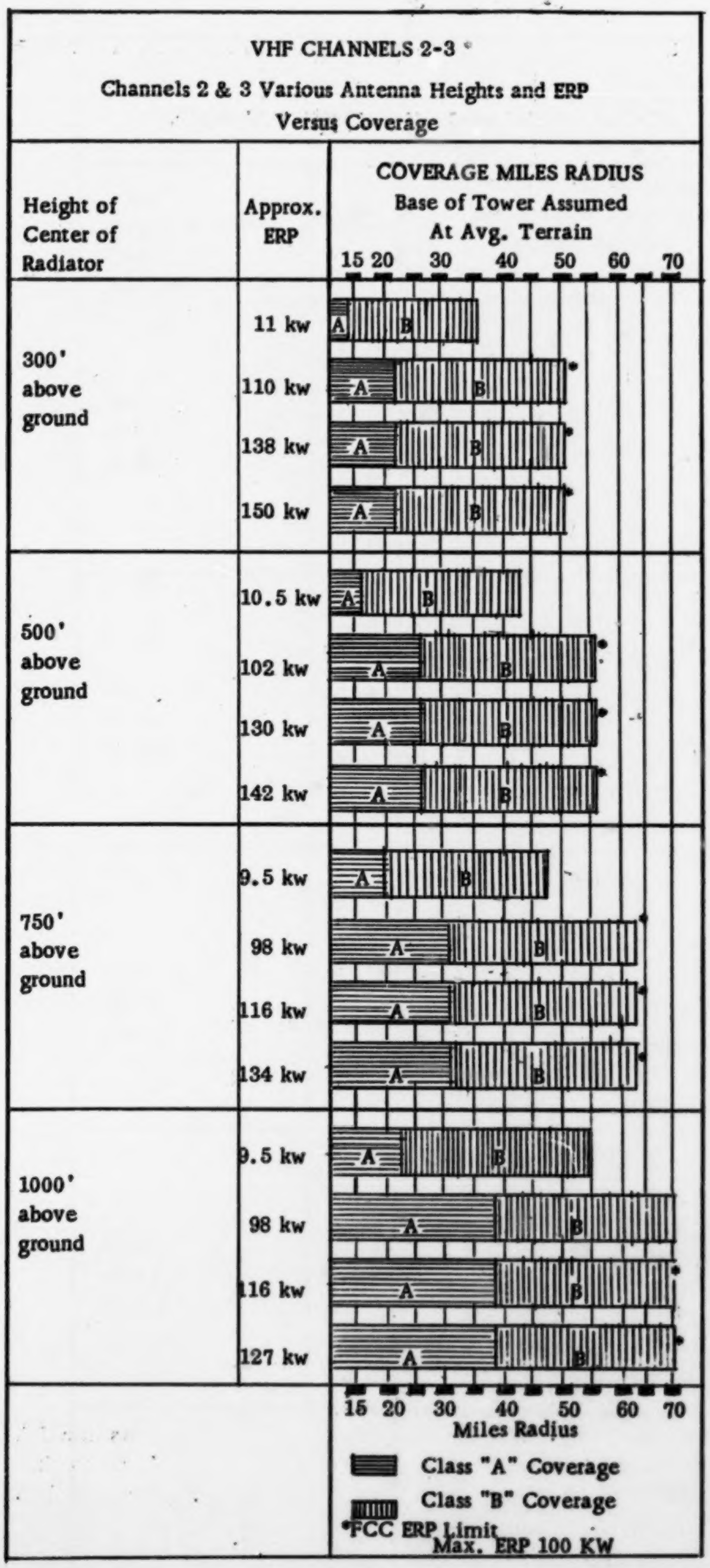

UHF TRANSMITTER, ANTENNA & OPERATING COSTS*
Height of Center of Radiator
Approx. ERP
TRANSMITTER & ANTENNA EQUIPMENT COSTS
Thousands of Dollars
100
200
300
400
TRANSMITTER OPERATING COSTS YEAR
12-Hours Day - 4380 Hours Yearly
5
10
20
30
40
50
60
70
300' above ground
20 kw
97.25
5.6
100 kw
130.25
12.0
200 kw
181.75
21.5
1000 kw
308.25
65.7
500' above ground
20 kw
112.0
5.6
100 kw
145.0
12.0
200 kw
196.5
21.5
1000 kw
323.0
65.7
750' above ground
20 kw
144.5
5.6
100 kw
177.5
12.0
200 kw
231.0
21.5
1000 kw
357.5
65.7
1000' above ground
20 kw
251.5
5.6
100 kw
284.5
12.0
200 kw
330.5
21.5
1000 kw
457.0
65.7
* All costs are estimated and subject to change.
Thousands of Dollars
Transmitter Monitoring Equip. & Filterplexer.
Guyed Tower Installed Antenna Transmission Line & Dehydrator
Thousands of Dollars
Above Includes Transmitter Tubes & Power Costs Only

TABLE 5

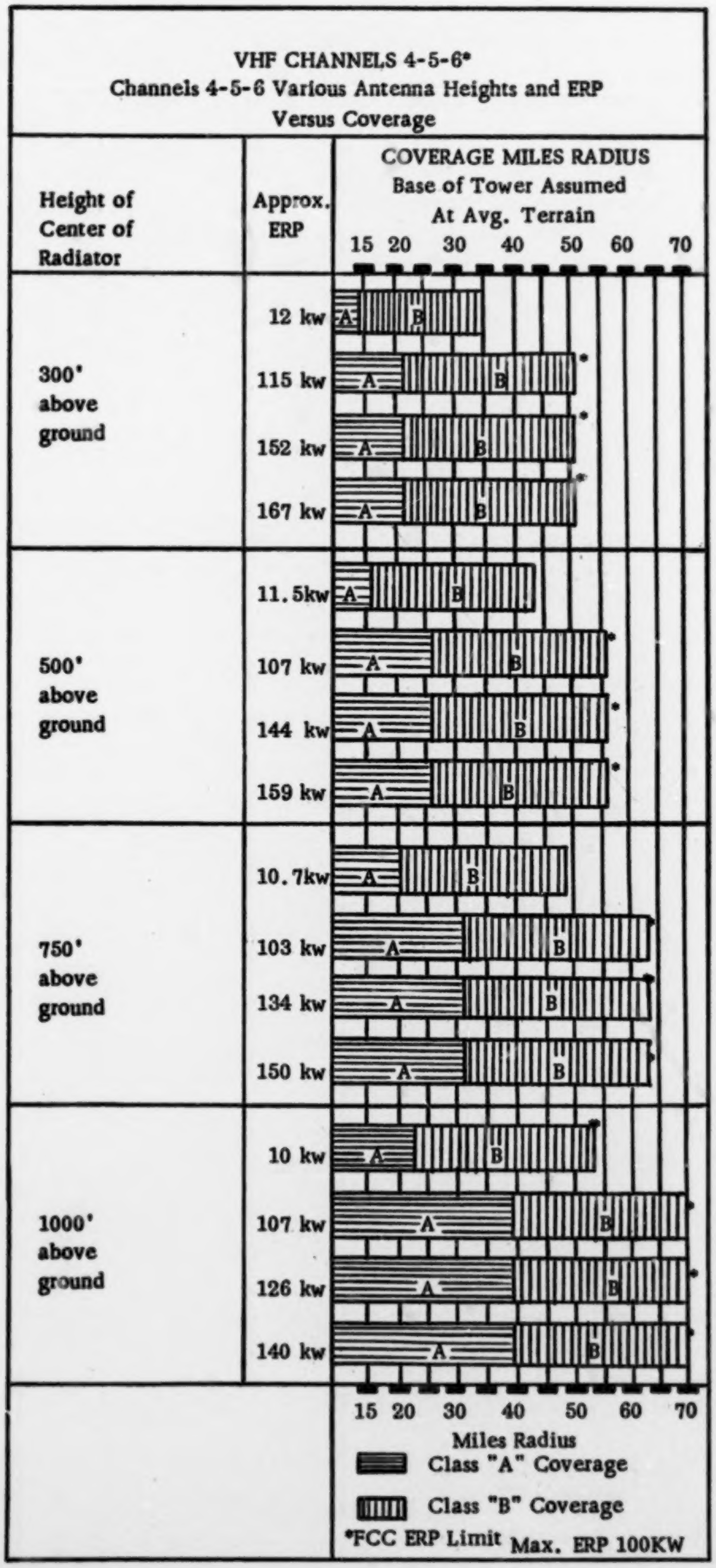


VHF CHANNELS 2-3

Channels 2 & 3 Various Antenna Heights and ERP Versus Coverage

By Permission. Radio Corporation of America, Camden, New Jersey.

TABLE 6

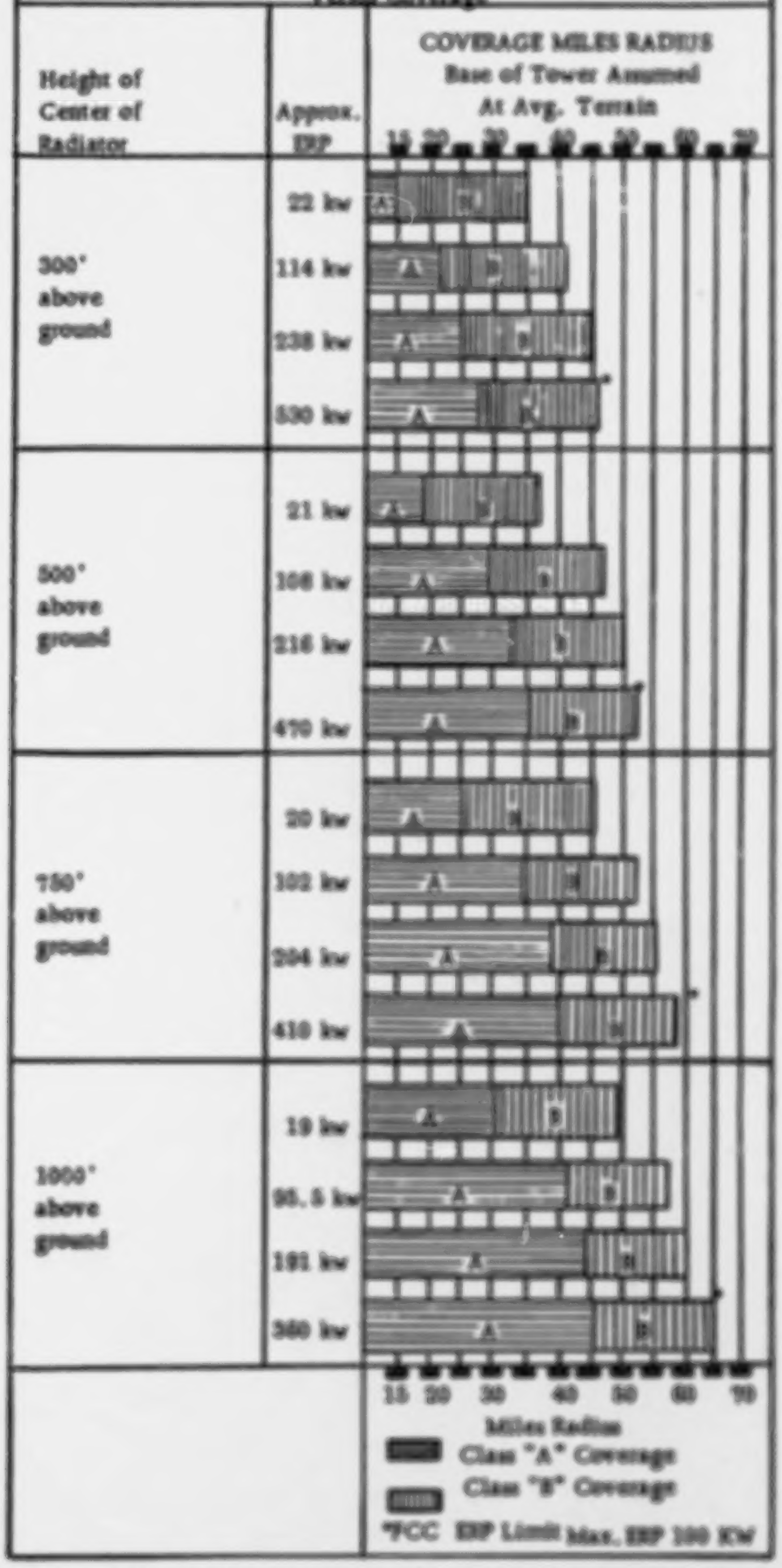


By Permission. Radio Corporation of America, Camden, New Jersey.

TABLE 7

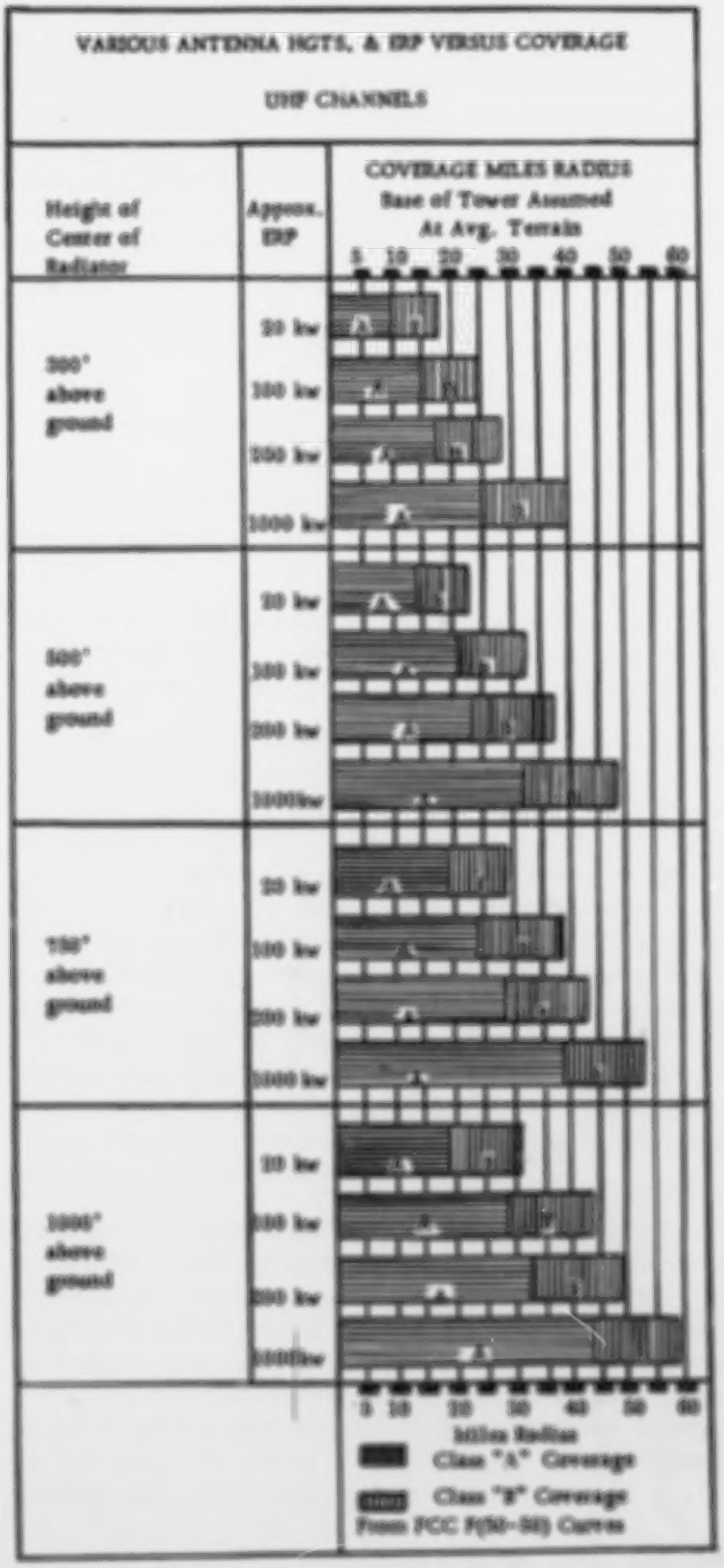
VHF CHANNELS 7 to 13

Channels 7 to 13 Various Antenna Heights and ERP Versus Coverage



By Permission. Radio Corporation of America, Camden, New Jersey.

TABLE II



By Permission. Radio Corporation of America, Camden, New Jersey.

Satellites - Translators

A satellite transmitter is a standard transmitter which derives the modulating signals from an adjacent transmitter. The signals from the adjacent transmitter are demodulated, and the video and audio are used to modulate the satellite. Translators operate on a heterodyne principle; the RF signal from an adjacent transmitter is converted by the translator and rebroadcast at a different frequency. Both the satellite and translator are used to extend services of an existing station,are licensed according to the rules and regulations of the FCC. An example of how the service might be extended through multiple use of translators follows in the proposal which was prepared by Adler Electronics, Inc.[1]

An educational television rebroadcast system for western North Carolina (See FIGURE 1).

> The educational television network presented is designed to bring to the various communities of western North Carolina, the complete ETV program schedule of WUNC-TV, the University of North Carolina's educational television broadcast station.
>
> This network is based on the use of modern low cost circuits and techniques which have been developed in the laboratory, and which have been proven after years of testing in the field.
>
> This educational television network is based on the Heterodyne Repeater principle of TV rebroadcasting. In such a system the TV signal, as it goes along the relay chain, is not subjected to the demodulation and remodulation process at each transmitting point, but merely undergoes frequency conversion at these sites. By this we mean, the sound and picture information is not extracted or separated from the carriers. Only the frequency of the carriers is changed. Since most of the sound and picture degradation occurs during this separation process, it can be seen that deterioration of these signals is held to an absolute minimum. Picture and sound of the highest fidelity is the end result. This, plus the fact that both the aural and visual signals are carried along through a common transmitter, enables simple, economical equipment to be employed.
>
> The various translator stations which make up the educational television network proposed for western North Carolina may be considered as having two functions. The primary function, of course, is one of making ETV signals available over the communities in their service area. The secondary function is (achieved at the same time and with no duplication of equipment), to direct a portion of the total developed translator power toward the next station along the chain, making its signal available for rebroadcasting and further relaying over its facilities.

---

[1] By permission. Adler Electronics Laboratories, Inc., LeFevre Lane, New Rochelle, New York.

Schedule A (Albemarle area).

A 1033 Ft. "off the air" pickup point located west, and slightly north of Abner, North Carolina,was chosen as the initial translator site. 50 watts of the translator output is directed to service the City of Albemarle and provide it with the programs of WUNC-TV. The remaining 50 watts is directed to the second translator site located at Shupings Mill.

Schedule B (Salisbury, Kannapolis and Concord areas).

Ths Shupings Mill translator installation receives the signals of the first translator station, and again through a system of power dividing networks, the output of this translator services the towns of Salisbury, Kannapolis and Concord. Portions of this output signal are also directed to translator installations located at Eutola and at the WSOC-TV transmitting site.

Schedule C (Charlotte area).

A 100 watt translator station is located at the WSOC-TV transmitter site, and will use that station's facilities, mainly the transmitter building, to house the translator equipment and the station's broadcast tower to mount the ETV broadcast antennas. No power splitting will be employed on this site, since the next translator pickup point (WBTV's tower) is located within the primary coverage area.

Schedule D (Hickory and Morganton areas).

The translator station located at Eutola receives its input signal from the Shupings Mill transmitter, and provides the ETV service to the Statesville area. Here again, the output signal is divided so that a portion directed toward the next site, Smith Mountain, is picked up by that installation and rebroadcast over the Hickory-Morganton area.

Schedule E (Shelby area).

WBTV's facilities are similarly used for the following translator site. This translator installation will service Gastonia and will also provide a pickup signal at the following Cherry Mountain site, at which point another translator installation will rebroadcast this signal over the Shelby area.

Schedule F (Marion area).

The Smith Mountain translator output is also rebroadcast by the Bald Mountain translator site. The city of Marion receives its ETV programming from this station.

Schedule G (Hendersonville area).

The 100 watt translator station located at Bearwallow Mountain is capable of receiving its input signal from either the Bald Mountain or the Cherry Mountain translator installations. This offers the advantage of selecting the better of the two input signals for subsequent repeating. Also, should difficulties occur which may make one branch of the system inoperative, the second signal would be available for use. The Bearwallow installation services the City of Hendersonville, and also provides a signal at the Spivey Mountain translator site.

Schedule H (Asheville area).

The translator system installed at Spivey Mountain will make available to the City of Asheville the ETV programming from WUNC-TV, Chapel Hill, N. C. If it is found necessary at a later date, this system can be expanded further west to include any areas intended to receive service. In a similar fashion, the signals of any repeater station in this system may be used to extend the service north into Virginia or south into South Carolina.

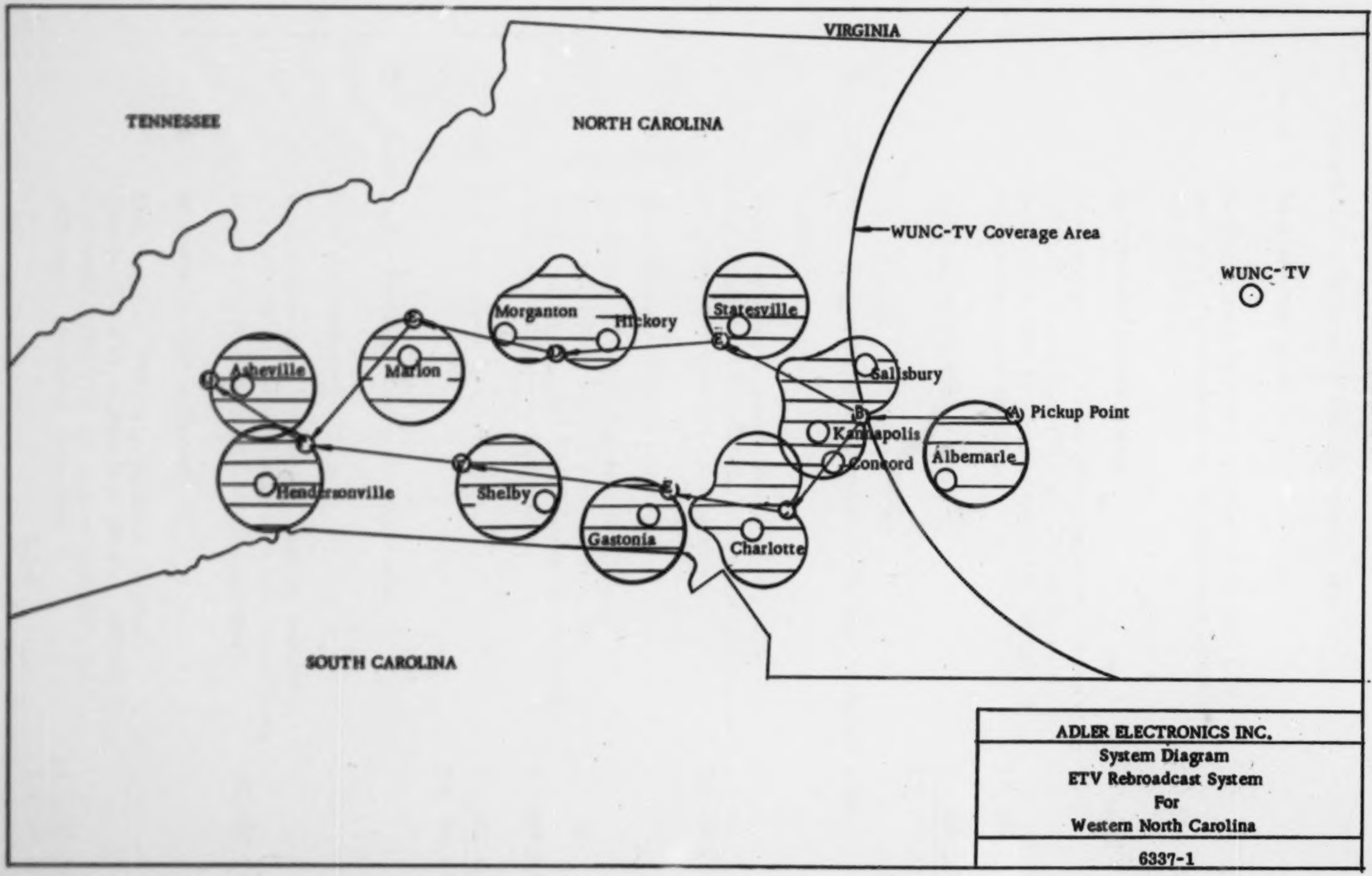
FIGURE 1 illustrates a typical method of extending the service of a broadcast station. Similar proposals have been prepared for a number of areas including the Washington County Schools, Hagerstown, Maryland, the Florida Educational Rebroadcast Network, the Central Michigan College and others. Many communities may find this method of repeating broadcasts provides television program services from distant stations at a relatively low cost. A number of communities have formed non-profit corporations and have raised funds to inaugurate translator services. Some have incorporated closed-circuit distribution systems in addition to the rebroadcast principle to provide domestic television services in their remote communities.

The directivity of translator station radiation can enhance efficiency by concentrating the signal over selected (populated) areas with relatively high power but with conservation of frequency spectrum space. Thus the same frequency may be used nearby for another program service with freedom from co-channel interference.

The Heterodyne Repeater principle affords a practical method of transporting video signals. The signal quality suffers very few detrimental effects as a result of frequent repeater useage. Since repeater stations need not demodulate the signal, the quality of the video signal is maintained at or near its original quality by signal to noise ratio comparisons.

Engineering services are available to assist interested applicants in planning and developing such services in their respective communities. Most of the major manufacturers' field representatives can assist institutions in preparing necessary FCC application requirements.

FIGURE 1


VIRGINIA
TENNESSEE
NORTH CAROLINA
SOUTH CAROLINA
WUNC-TV Coverage Area
WUNC-TV
(A) Pickup Point
B
C
D
E
Asheville
Hendersonville
Marion
Morganton
Hickory
Statesville
Salisbury
Kannapolis
Concord
Albemarle
Charlotte
Gastonia
Shelby

ADLER ELECTRONICS INC.
System Diagram
ETV Rebroadcast System
For
Western North Carolina
6337-1

1. Schedule A - Equipment listing (Albemarle area).

a.	Translator equipment	
	Receiving antenna system, translator (100 watt UHF amplifier), transmission line, 2 transmitting antennas and miscellaneous	$10,685.75
b.	Recommended test equipment	
	Oscilloscope, VHF sweep generator, crystal detector (50 Ohm), dummy load (50 ohm, 200 watt), multimeter, UHF/VHF TV receiver (portable), miscellaneous cables and connectors	$ 1,109.92
c.	Building, tower, etc.	$ 800.00
	Total	$12,595.67

2. Schedule B - Equipment listing (Kannapolis-Salisbury-Concord area)

a.	Translator equipment	
	Receiving antenna, rebroadcast receiver, translator (100 Watt, UHF amplifier), transmission line, transmitting antenna and miscellaneous	$13,180.75
b.	Recommended test equipment	
	Oscilloscope, VHF sweep generator, crystal detector (50 ohm), dummy load (50 ohm, 200 watt), multimeter, UHF/VHF TV receiver (portable), miscellaneous cables and connectors	$ 1,109.92
c.	Building, tower, etc.	$ 2,500.00
	Total	$16,790.67

3. Schedule C - Equipment listing (Charlotte area)

a.	Translator equipment	
	Receiving antenna, rebroadcast receiver, translator, 100 watt UHF amplifier, transmission line, transmitting antenna and miscellaneous (use existing tower)	$13,080.75
b.	Recommended test equipment	
	Oscilloscope, VHF sweep generator, crystal detector (50 ohm), dummy load (50 ohm, 200 watt), multimeter, UHF/VHF TV receiver (portable, miscellaneous cables and connectors	$ 1,109.92
	Total	$14,190.67

4. Schedule D - Equipment listing (Hickory-Morganton area).

a. Translator equipment

Receiving antenna, rebroadcast receiver, translator, 100 watt UHF amplifier, transmission line, 2 transmitting antennae and miscellaneous $13,290.75

b. Recommended test equipment

Oscilloscope, VHF sweep generator, crystal detector - 50 ohm, dummy load - 50 ohm, 200 watt, multimeter, UHF/VHF TV receiver (portable), miscellaneous cables and connectors $ 1,109.92

c. Building, tower, etc. $ 1,500.00

Total $15,900.67

5. Schedule E - Equipment listing (Gastonia-Shelby-Hendersonville and Statesville-Marion areas).

a. Translator equipment

Receiving antenna, rebroadcast receiver, translator, 100 watt (UHF amplifier), transmission line, 2 transmitting antennae and miscellaneous $12,110.75

b. Recommended test equipment

Oscilloscope, VHF sweep generator, crystal detector (50 ohm), dummy load (50 ohm, 200 watt), multimeter, UHF/VHF TV receiver (portable), miscellaneous cables and connectors $ 1,109.92

c. Building, tower, etc. $ 1,500.00

Total $14,720.67

6. Schedule F - Equipment listing (Hendersonville area)

a. Translator equipment

Receiving antenna, rebroadcast receiver, translator 100 watt (UHF amplifier), transmission line, 2 transmitting antennae and miscellaneous $12,110.75

(1) Translator equipment (optional)

Receiving antenna (parabolic) and rebroadcast receiver $ 1,600.00

b.	Recommended test equipment	
	Oscilloscope, VHF sweep generator, crystal detector (50 ohm), dummy load (50 ohm, 200 watt), multimeter, UHF/VHF TV receiver (portable), miscellaneous cables and connectors	$ 1,109.92
c.	Building, tower, etc.	$ 500.00
	Total	$15,320.67

7. Schedule G (Asheville area)

a.	Translator equipment	
	Receiving antenna, rebroadcast receiver, translator 100 watt UHF amplifier, transmission line, transmitting antenna and miscellaneous	$11,560.75
b.	Recommended test equipment	
	Oscilloscope, VHF sweep generator, crystal detector (50 ohm), dummy load (50 ohm, 200 watt) multimeter, UHF/VHF receiver (portable), miscellaneous cables and connectors	$ 1,109.92
c.	Building, tower, etc.	$ 1,500.00
	Total	$14,170.67

8. Schedule H – equipment listing for City of Charlotte only

a.	Translator equipment	
	Translator, 100 watt, UHF amplifier, transmission line, transmitting antenna, miscellaneous (use existing tower)	$11,480.75
b.	Recommended Test Equipment	
	Oscilloscope, VHF sweep generator, crystal detector (40 ohm), dummy load (50 ohm, 200 watt), multimeter UHF/VHF TV receiver portable), miscellaneous cables and connectors	$ 1,109.92
	Total	$12,590.67

Closed-circuit refers to other than broadcast services, and denotes coaxial cable or micro-wave transmission. Either system is basically a private communication system, in that only predetermined areas may receive service. The choice of open-circuit and/or closed-cicruit is predicated on the basis of the selection of area(s) and audience(s) to be served, as indicated in planning stages.

A closed-circuit system involves many rather complex engineering problems. It is important to employ competent engineers or engineering firms to design, install and align the system. Since one coaxial cable can serve multiple radio frequency channels simultaneously the cost to increase the number of services in a cable is relatively small. Since each television channel (norminally 6 megacycles) occupies spectrum space approximately four times the spectrum space of the entire (1.5 megacycles) Standard Broadcast Amplitude Modulation (AM) radio service, it becomes understandable that the techniques and design consideration of a closed-circuit television system must be of extremely high tolerance. Intermodulation, signal to noise ratio, nonlinear frequency attenuation, variable attenuation (due to temperature changes of the cable)and the use of automatic level(gain) amplifiers (which compensate for nonlinear attenuation) are some of the problems which confront the design engineers proposing a closed-circuit system. It is not possible to avoid such problems, except in cases where only several hundred feet of coaxial cable are to be installed for a limited service operation.

A simplified 6 channel television closed-circuit origination system is shown in FIGURE 2. This is a radio frequency (RF) system employing 6 RF generators which are modulated by conventional television modulation technques (audio level + 12 decibles above zero reference of 6 milliwatts, 600 ohm; video level 1.4 volts peak to peak across a 75 ohm line). The (low level) outputs of the six transmitters are combined and transmitted on a single cable. Channels 2, 4, and 6 are generated at standard channel frequency. Channels 7, 9 and 11 are generated at sub-carrier frequencies and are electronically converted at the prescribed viewing areas. All channels are viewed in the respective classrooms with regular television receivers. This provides the Washington County Schools of Maryland with a potential service of 6 simultaneous telecasts. The round robin technique provides the opportunity to originate at a number of selected places. Caution must be exerted to assure that the signal quality will equal the service normally expected from standard broadcast services. Leased services include the RF modulators, coaxial cable and terminal equipment. In buildings serviced, the RF signals are amplified and distributed within the building by cable supplied and installed by the institution. These are optional services and may also be included in leased services (excluding TV receivers).

The following lists cost information for ownership of a closed-circuit system.[1]

1. Cost for a standard 5 channel television cable system.

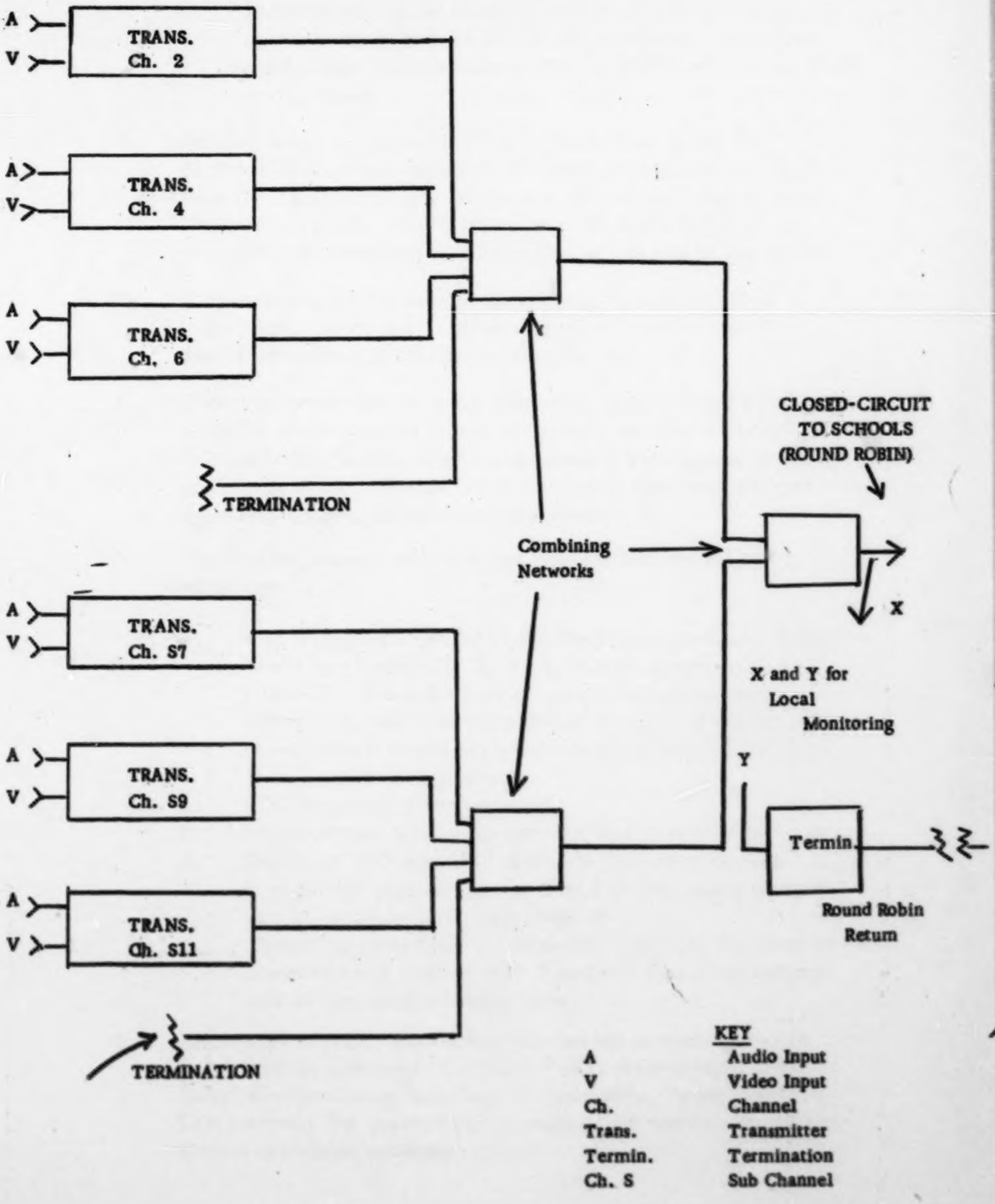
    a. Installation on existing poles, \$3,000.00 to \$3,500.00 per mile for distances of 10 miles or more; slightly higher for shorter distances.

---

[1] By permission. Jerrold Electronic Corporation, System Sales Division, 15th & Lehigh, Philadelphia 32, Pennsylvania.

FIGURE 2

SIMPLIFIED 6 CHANNEL RADIO FREQUENCY TELEVISION SYSTEM


A
V
TRANS.
Ch. 2
A
V
TRANS.
Ch. 4
A
V
TRANS.
Ch. 6
TERMINATION
Combining
Networks
CLOSED-CIRCUIT
TO SCHOOLS
(ROUND ROBIN)
X
X and Y for
Local
Monitoring
Y
Termin.
Round Robin
Return
A
V
TRANS.
Ch. S7
A
V
TRANS.
Ch. S9
A
V
TRANS.
Ch. S11
TERMINATION

KEY

A	Audio Input
V	Video Input
Ch.	Channel
Trans.	Transmitter
Termin.	Termination
Ch. S	Sub Channel

b. Installation with erection of poles, $3,500.00 to $4,000.00 per mile for distances of 10 miles or more; slightly higher for shorter distances (plus right of way costs).
c. Modulators and "head-end" equipment, approximately $1,000.00 per channel.
d. Terminal wiring for receiver outlets in viewing areas, approximately $25.00 to $50.00 per outlet. This does not include conduit costs which vary according to local wiring codes.

2. Service range is limited to 20 mile trunk lines or an 800 decibles long system (based on JT-200S Jerrold cable or equivalent). Greater lengths of service can be achieved if lower loss cable is used. This is based on a 40 decibles signal to noise ratio or broadcast quality signal at the end of the cable.

3. A twenty mile system can be maintained by one full time technician. Spare parts, tubes and miscellaneous repairs should not exceed $500.00 per year for the plant.

4. Distances or services over an area using several hundred miles of cable would provide broadcast quality service on the basis that each distribution line would emanate from a central hub and not be longer than 20 miles. Two full time technicians should be capable of servicing the plant.

5. Distribution systems utilizing one cable offers the following advantages.

   a. 5 to 9 channels can be transmitted simultaneously; these could be channels 2, 3, 4, 5, 6 and sub-channels 7, 9 11 and 13. The sub-channels would be converted to natural frequency at the point of useage.. Addition of sub-channels would not substantially affect initial costs as indicated for 5 channels.
   b. FCC licensing is not required.
   c. Antennaeand towers are not required at receiving locations.
   d. Broadcast VHF and UHF channels (including special Stratovision signals) can be added to the system without special equipment at each receiver.
   e. Operating costs are low, as demonstrated by hundreds of closed-circuit systems with 5 years of operation serving tens of thousands of subscribers.

6. Amortization and depreciation information is referred to the Ralph Fratkin Company, Certified Public Accountants, Market Street National Bank Building, Philadelphia, Pennsylvania. This company has speciulized in accounting methods for closed-circuit television systems.

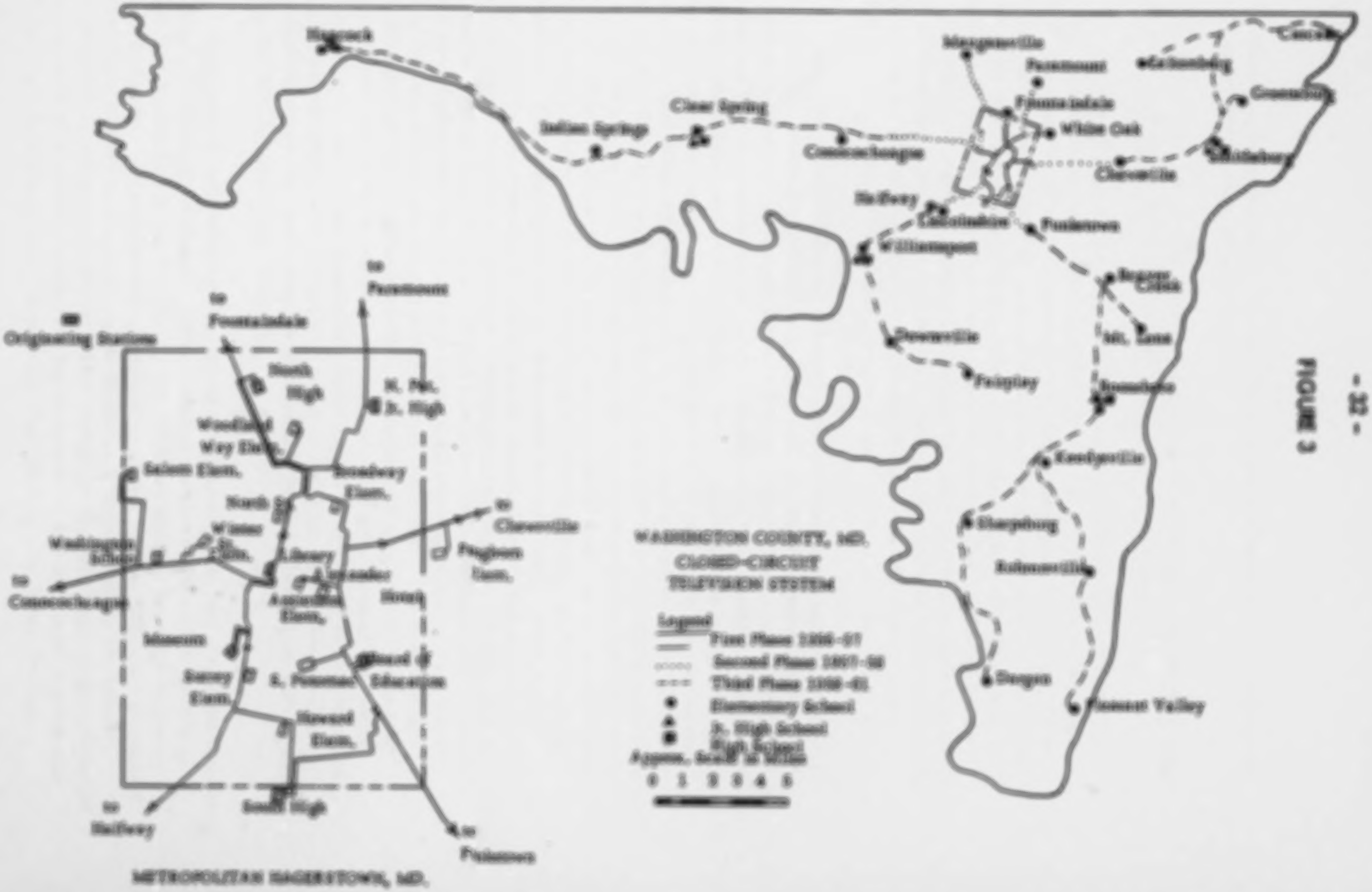
A typical county wide distribution closed-circuit system is illustrated in FIGURE 3. This is the Washington County, Maryland, system and is operated on a lease basis. The Chesapeake and Potomac Telephone Company of Maryland provides the service. The local common carrier service or Bell System office in any community throughout the United States can give service information to interested applicants.

It is to be noted that the expansion of the system was projected over a three year progression. The programming was also developed over a similar pattern, starting with a small number of schools and a very limited program. The organization of the operation thus was developed through a three step progression which helped to reduce administrative, educational, economical and engineering problems. This permitted a period of development of facility and personnel to achieve most efficient growth.

The chief advantage of a radio frequency closed-circuit distribution is (1) the flexibility of such an operation, (2) the number of channels available and (3) the relatively low cost of an installation. The cost of a multi-channel operation should be compared to an open-circuit cost before deciding on a method of distribution. A six channel system may well prove to offer much more flexibility than a single channel open-circuit system, and may service the area desired. FCC regulations do not apply to closed-circuit operations, except for limitations on radiation which may result from improper design or operation. Technical requirements are high, and the performance compares favorably with the quality of broadcast, a signal to noise ratio of 40 decibles. Present closed-circuit techniques limit the length of cable which can be used satisfactorily to about 30 miles. New design of broad band amplifiers will likely extend the service range to 200 miles. With an improvement of 6 decibels in intermodulation characteristics, thermal and random noise factors in broad band amplifiers, closed-circuit systems can be extended to 60 miles. With an improvement in design characteristics of 10 to 15 decibels, systems (trunk lines utilizing cascaded amplifiers) can be extended to approximately 200 miles.

Basic installations favor a one way system, that is, picture and sound transmission from the point of origin to points of reception only. Some administrators indicate a desire and necessity for a talk back system whereby viewers at receiving areas may talk to the point of origin through a convenient and immediate facility. Likewise, some have indicated a need for a method for the point of origin to be able to see into the viewing areas by means of a television system. These can be designed for an installation. A serviceable and efficient method to carry out these functions is costly. The merit of such a system has to be evaluated in terms of cost. Many educators feel such a service interferes and is detrimental to the advantages television has to offer. Two important considerations need to be studied to determine the kind of two-way talk systems which are the most advantageous. (1) Present teaching methods favor a system which suggests the point of origin have the facility to direct questions to viewers and receive immediate responses from students over widespread areas. Likewise, a method for viewers to contact the point of origin to ask questions (of the studio teacher) with a minimum of difficulty. (2) Some teaching methods and appropriate communication facilities need to be devised wherein appropriate relationships among the studio teacher, classroom teachers and viewing area students are provided for the most profitable student learning stiuation. (The present relationships are believed to

FIGURE 3


Hancock
Indian Springs
Clear Spring
Conococheague
Maugansville
Paramount
Fountaindale
White Oak
Chewsville
Leitersburg
Cascade
Smithsburg
Halfway
Lincolnshire
Funkstown
Williamsport
Beaver Creek
Mt. Lena
Downsville
Fairplay
Boonsboro
Keedysville
Sharpsburg
Rohrersville
Dargan
Pleasant Valley
WASHINGTON COUNTY, MD.
CLOSED-CIRCUIT
TELEVISION SYSTEM
Legend
First Phase 1956-57
Second Phase 1957-58
Third Phase 1958-61
Elementary School
Jr. High School
High School
Approx. Scale in Miles
0 1 2 3 4 5
Originating Stations
to Fountaindale
to Paramount
North High
N. Pot. Jr. High
Woodland Way Elem.
Salem Elem.
Broadway Elem.
North St.
Winter St. Elem.
Washington School
Library
Antietam Elem.
to Chewsville
Pangborn Elem.
to Conococheague
Museum
Surrey Elem.
S. Potomac
Board of Education
Heward Elem.
South High
to Halfway
to Funkstown
METROPOLITAN HAGERSTOWN, MD.

leave something to be desired.) The addition of a conventional two-way talk system should be studied in terms of merit and cost.

The present use of television (in education) relies basically on standard classroom techniques which are often not well adapted to the television arts.

The use of coaxial line for video distribution provides a very high quality service. The disadvantages of such distribution are that (1) only several hundred feet of cable can be utilized because of transmission problems encountered, (2) a separate cable must be used for each video signal; that is, one cable for one studio signal, two for two studio signals etc., and (3) the associated audio signal must be carried on a land line (a separate cable or pair of wires). The cable used for such service must terminate in the proper characteristic impedance of the cable and equipment at the origination point. This normally can be achieved with engineering design and installation procedures. For very short distances, video distribution is very desirable. See ILLUSTRATION 2.

Microwave transmitters are point-to-point communication systems and are used primarily, to cover relatively large distances. These are licensed by the FCC (according to strict rules), are available in limited numbers in any one operation. The cost per unit may reach approximately $45,000.00 This includes the transmitter, receiver, land, power requirements, towers, test and maintenance equipment. The studio originating equipment, receiving and distribution equipment are needed additionally. Generally, microwave systems are used to transport the video (and often audio) signals from (1) a studio (point of origin) to a broadcast transmitter some distance away, (2) one city or institution to another, (3) a studio to a remote viewing area (in such cases when the use is very infrequent and the use of land lines or coaxial line(s) is impractical), and/or (4) remote location relative to the studio, to the studio (or transmitter). The audio signals may be dispatched via land lines. A microwave system would be recommended for rather special situations involving point-to-point television communication requirements. Microwave equipment is normally used in conjunction with or subordinate to standard broadcast transmitter operations. Experimental use of microwave facilities (on a lease basis) was conducted by the Jefferson County Schools of Kentucky to multiple areas from one studio. The operation has been discontinued for a number of reasons. Since current application of television in educational activities has not been appropriately studied in terms of cost versus utility (as in the case of most television operations), it is impossible for this report to compare costs of leased with ownership microwave facilities. The Jefferson County Schools of Kentucky are continuing use of television through cooperation with television station WAVE-TV, Louisville, Kentucky.

Receivers or monitoring devices are of two general types, namely, video monitors and standard television receivers. Large screen projection systems are available as either; that is, the device has two inputs, one for video and one for radio frequency modulated signals. All monitors and receiving equipment require controlled or reduced ambient light intensities, the large screen projection system requiring the lowest light condition for satisfactory service. Few institutions find the large screen projection system capable of projecting screen size (approximately 6 feet by 8 feet) pictures with sufficient light intensity to meet the ordinary class viewing situations. Through

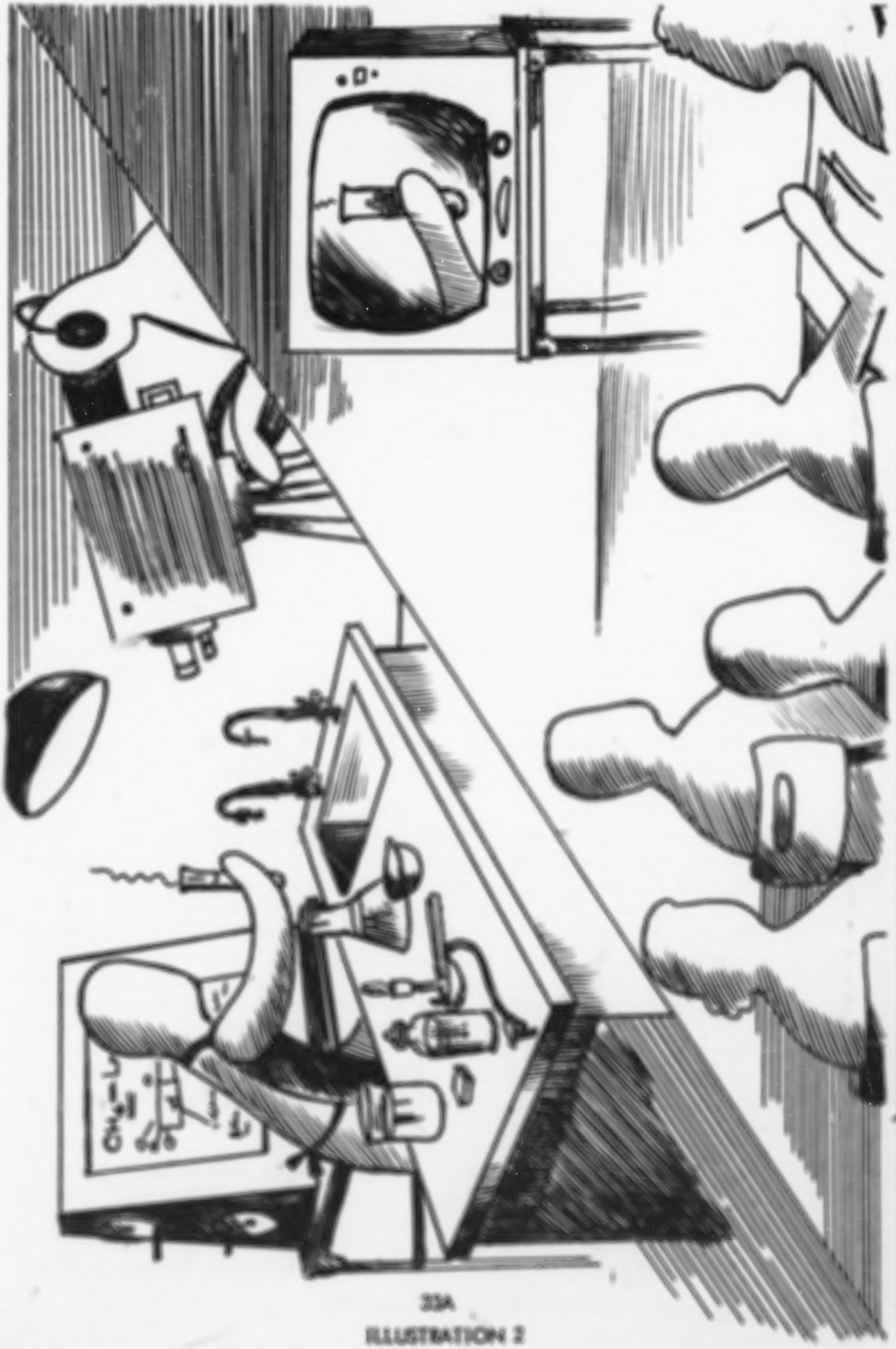


ILLUSTRATION 2

modified interior lighting systems, the large screen projector is used satisfactorily in but a few instances. The projection system requires more careful adjustment than television receivers and is seldom operated satisfactorily by classroom personnel (students or teachers).

Modulated television signals are delivered to viewing area monitors or television sets by (1) direct coaxial line, or (2) radiation, broadcast signal. A single radio frequency demodulator may be used to detect "*off air*" video signals and these in turn may be distributed throughout an area to video monitors via coaxial line. A direct line (coaxial) from the television studio may carry the video signals to video monitors placed according to viewing area requirements. In either of these two cases, separate audio lines are required to carry the audio signal from the demodulator or TV studio, respectively, to placed speakers (with additional amplification as necessary for the audio signal). With multiple demodulators and/or coaxial lines to preselected areas, several areas may be served with multiple programming.

Signals within an area may be supplied by broadcast transmitters (open-circuit) or closed-circuit or combinations of both, distributed within the building by coaxial line (closed-circuit).

Open-circuit transmissionsmay be selected on a receiver by a local antenna (located on or in the television receiver) or a common exterior antenna serving a building and adjacent areas. A high gain, selective antenna may be employed to increase signal intensity and reduce effects of undesired signals. The common outdoor antenna is often located in the most favorable position that is practical, and takes advantage of height, overcomes reflections (ghosts) and other undesirable conditions to improve reception of open-circuit signals. Simultaneous reception of several stations often requires separate antenna (perhaps on the same mast) directed toward the transmitting stations.

Closed-circuit operations require a continuous coaxial cable from studio origination point(s) to the receivers. Within building distribution system are commonly referred to as community antenna or "house" systems. The techniques are quite similar to overland (RF) distribution via coaxial cable, yet there are certain considerations which at some marginal point must revert to the more complex engineering requirements. A very limited but sufficient treatment of this area is discussed and displayed in an Educational Facilities Laboratory Inc., publication available from their offices at 477 Madison Avenue, New York 22, New York, in the section titled "Planning Schools With Television." [1]

Present engineering practices are efficient in closed-circuit RF systems to provide multiple (both power and signal) outlets for receivers in each desired viewing area. Each RF outlet is isolated electronically from the others to eliminate picture interference. Sufficient signal strength (normally at least 1 millivolt or more) is provided at each receiver to permit classroom orientation to follow any number of patterns. With multiple receivers, several telecasts may be monitored simultaneously. A number of classrooms may be equipped with multiple outlets and receivers (one receiver per outlet). Hundreds of classrooms may be serviced from closed-circuit distribution systems. Hagerstown, Maryland, has nearly 200 classrooms equipped in approximately 40 school buildings located in areas throughout Washington County serving over 650 receivers. Many classrooms are equipped with multiple outlets; some have as many as 10 or 15 receivers serving, in some cases, as many as 250 students. Many schools have outlets installed in nearly all classrooms. The cost of installing television outlets is most economical when the initial installation of service within a building is made. A good practice is to install outlets in or near the corners of ordinary classrooms (additional or other outlets may be selectively located in large areas where several classes may group at one time to view telecasts). Materials to wire a school for closed-circuit RF operation which has 14 classrooms costs about $800.00. This includes an amplifier, cable, tap-offs and outlets. Installation costs vary in different areas. Wiring codes (whether surface wiring or conduit and other factors) affect installation costs. The availability of alternating current (AC convenience) outlets is required for television receivers and sometimes present additional problems and costs in providing service. Plans for new building construction and old building rennovation plans should take such things into account.

---

[1] Dave Chapman, et. al. "Planning Schools with Television" Design for ETV pp. 21-30, 1960

Other classroom considerations should be included in television planning. These are (1) inside lighting fixtures which will not cause reflections in the television receiver display area, (2) control of outside as well as inside light to eliminate interference with the picture brightness, (3) suitable acoustical treatment in the classroom to permit good monitoring of the audio signal, (4) transmission of sound between classrooms must be minimized to avoid detrimental effects, and (5) floor treatment should be of a kind which will reduce noise distractions from various sources.

Television receivers purchased for use in conjunction with educational telecasts should be carefully selected and must be of high quality. The following items serve as guide posts for television set selection.

1. Enclosures which reduce electrical shock hazards with a minimum of 21 inch screen or larger (current productions are called 23 inch screens by virtue of new circuitry for better corner display); a larger screen is desirable for the picture size advantage.

2. Console models or models which have substantial audio power capacity and good (quality) sound reproduction with "front" mounted speaker(s).

3. Picture tube tilt (or stands which enable the set to be tilted) to help reduce high light reflections (outside and/or inside light sources).

4. Unitized chassis models to reduce service problems are extremely desirable (for institutions responsible for maintaining and servicing receivers).

5. Sets which employ polarized front glass (implosion screen) or the new sealed type, low glare screens.

6. Pre-set tuning (fine tuning, one-time set control) for channel tuning.

7. Standard controls located on side or front of the receiver to permit ease in tuning or adjusting (when elevated).

8. Horizontal and vertical size adjustments and linearity controls in accessible position for servicing.
9. Optional features may include provision to cover and lock controls, selective video or off-air switching (with or without UHF), 75 ohm (signal) input, heavy power input cords and suitable housing or cabinet for elevation. These may or may not be desirable, depending on the application.

STUDIOS

Two approaches are used as general institutional policy relative to the operation of television. Centralized refers to a concentration of the television equipment in a center serving the origination of most programs. Decentralized denotes an arrangement where originating television equipment is located in various departments throughout an institution. Comparing the two organization methods, the following describes the advantages and disadvantages of each.

Centralized	Decentralized
1. Equipment and materials are concentrated in one area.	1. Equipment and materials are dispersed in multiple areas.
2. Operating and test equipment can be interchanged with maximum efficiency.	2. Operating and test equipment less flexible, more equipment needed or must be moved as needed.
3. Staff personnel and materials are minimized with interchange of both for program requirements.	3. Involves more people within the institution allowing departments more flexibility and control over activities.
4. Convenience for (TV) staff members at inconvenience of teachers-professors.	4. More convenient for teacher-professors, but more inconvenient to TV staff members.
5. The exchange of ideas and inspiration which comes about by teachers working together is desirable.	

Studio sizes of various shapes and descriptions have been tried at one time or another, and the net result of these many trials indicate that seldom is any nominal size adequate. The usual answer given for the question "How large should an educational television studio be?" is, "It depends on what you are going to do." Operations seem to grow in any event to a point where a minimum requirement of each studio is at least 40 feet X 40 feet. Many people in the field find that large studios are very desirable. An operative studio of such a dimension requires approximately 2200 square feet additionally for storage, staff, maintenance, etc. Frequently, in the past, an institution entering the field of television has taken over an area which has been retired from other services. Administrators find it difficult to adapt the operation to their needs even at the expense of large sums of money. See TABLE 9. It is the very infrequent situation when a television committee or organization has the opportunity to design and plan space requirement for television. With the many problems of budgets, even with the opportunity to plan new space for television, so many compromises must be made that nearly every educational television operation in the country is suffering from lack of appropriate and adequate space. In apology, the comment which one usually hears is this, "We started simple, but we can't stay simple!" A simple but flexible mobile unit is shown in ILLUSTRATION 3.

Considering the requirements of the studio as a supporting element of the television operation (see ILLUSTRATION 4) these factors and recommendation are very important:

1. Studio dimensions in the order of 40 feet by 60 feet(floor space).
2. Adequate height (at least 15 feet) to assist in heat control and suspending lighting units. Higher ceiling heights allow staging materials to be pulled into the upper areas for temporary storage and ease in handling.
3. Ventilation and/or air conditioning to reduce heating of equipment and provide adequate personnel comfort under the rather extreme conditions of heat which is made intensive from lights and electronic equipment.
4. Accoustical treatment to render a reverberation time of approximately 0.5 second (avoid large parallel surfaces when practical).
5. Floors which are hard surfaced and smooth enough to permit movement of cameras while in use.
6. Finishing of floors, walls and ceiling (color and material) should be in keeping with light reflection efficiency and control.
7. Personal comfort (wholesome, pleasant atmosphere) as well as attractive appearance of the studio area lends much to improve operations.

Studio lighting requirements vary with various types of equipment. Three lighting considerations are suggested for use with, (1) image orthicon cameras, (2) vidicon cameras and (3) color cameras. The quantity of light needed for various cameras ranges from 50 foot candles minimum (for image orthicon, monochromatic cameras) to approximately 500 foot candles (for color cameras). Vidicon cameras require values in the range of 250 to 300 foot candles. (These values are measured as incident light). Practices of lighting follow those commonly used by commercial television broadcasters. The techniques and procedures which are most artistic employ model, key, back and flat lighting. The following information describes indoor lighting:

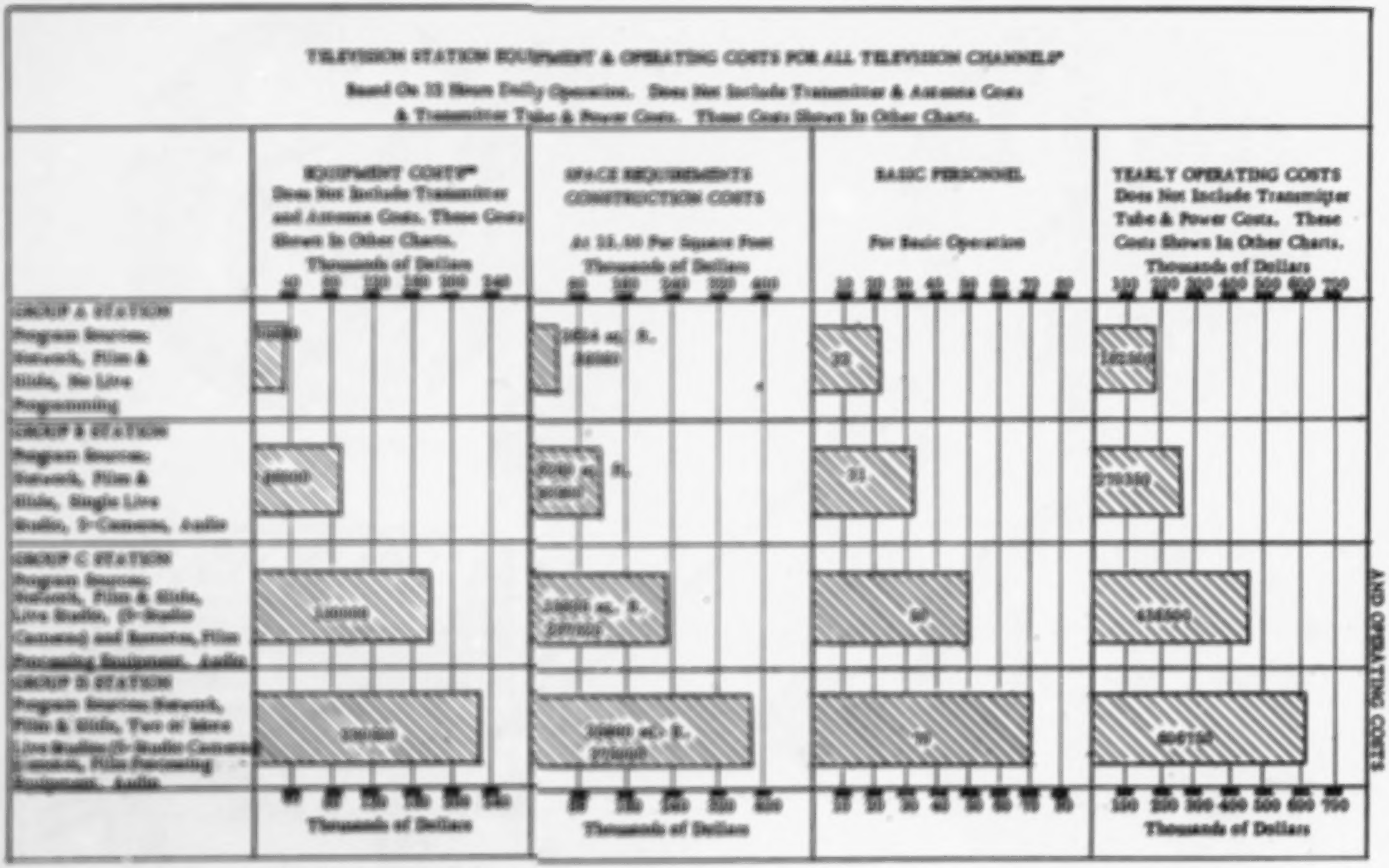
> Effective lighting of the scene being televised is essential to good video presentation.[1] The quantity and quality of scene lighting can affect

---

[1] "General Lighting Information," General Electric Intra-Tel Closed Circuit Television, pp. A 300.1, A300.2, April 15, 1958.

TABLE 9

TV STUDIO EQUIPMENT AND OPERATING COSTS



* Based on commercial television station practices.

** Based on Image Orthicon camera.

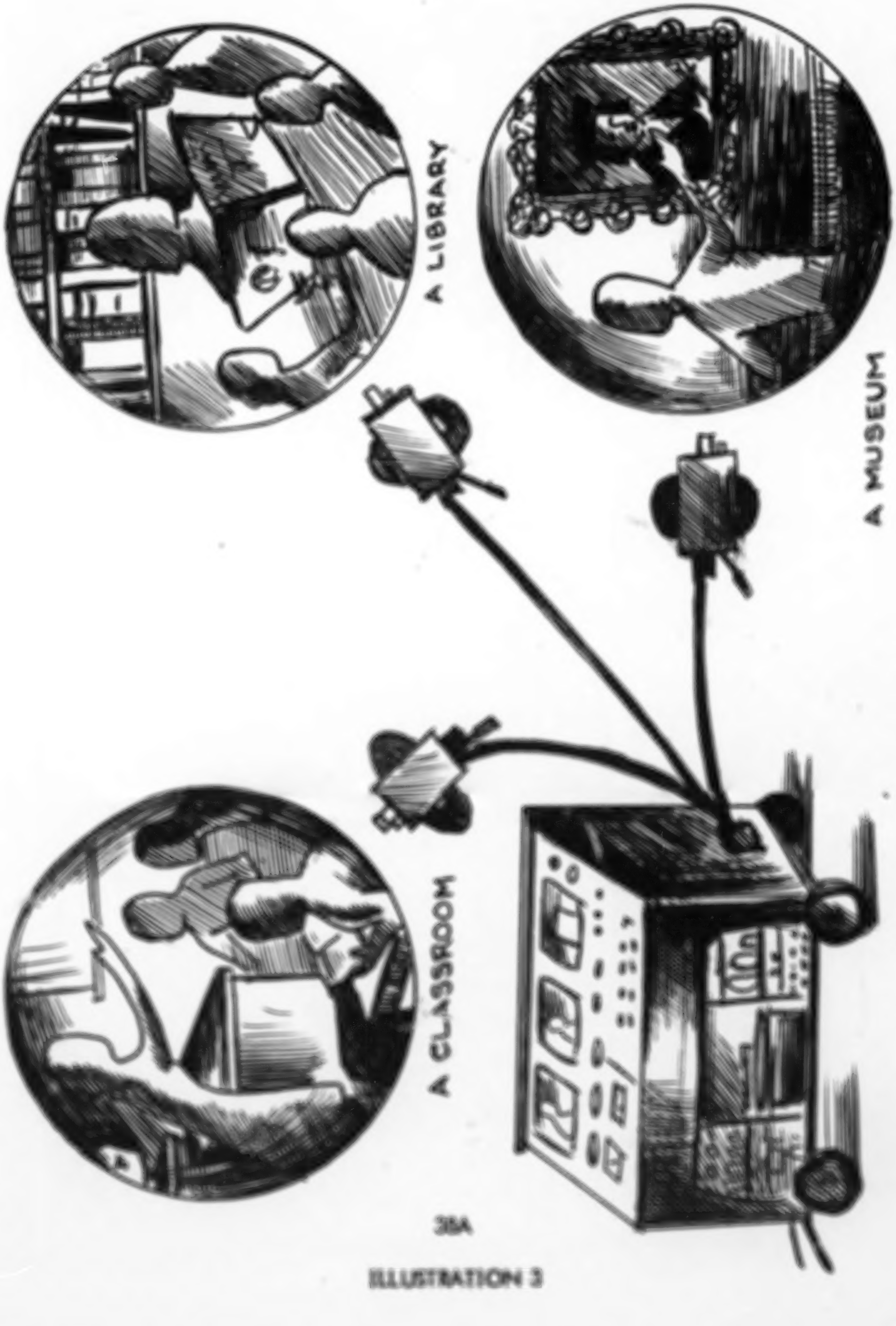

A LIBRARY
A MUSEUM
A CLASSROOM

ILLUSTRATION 3

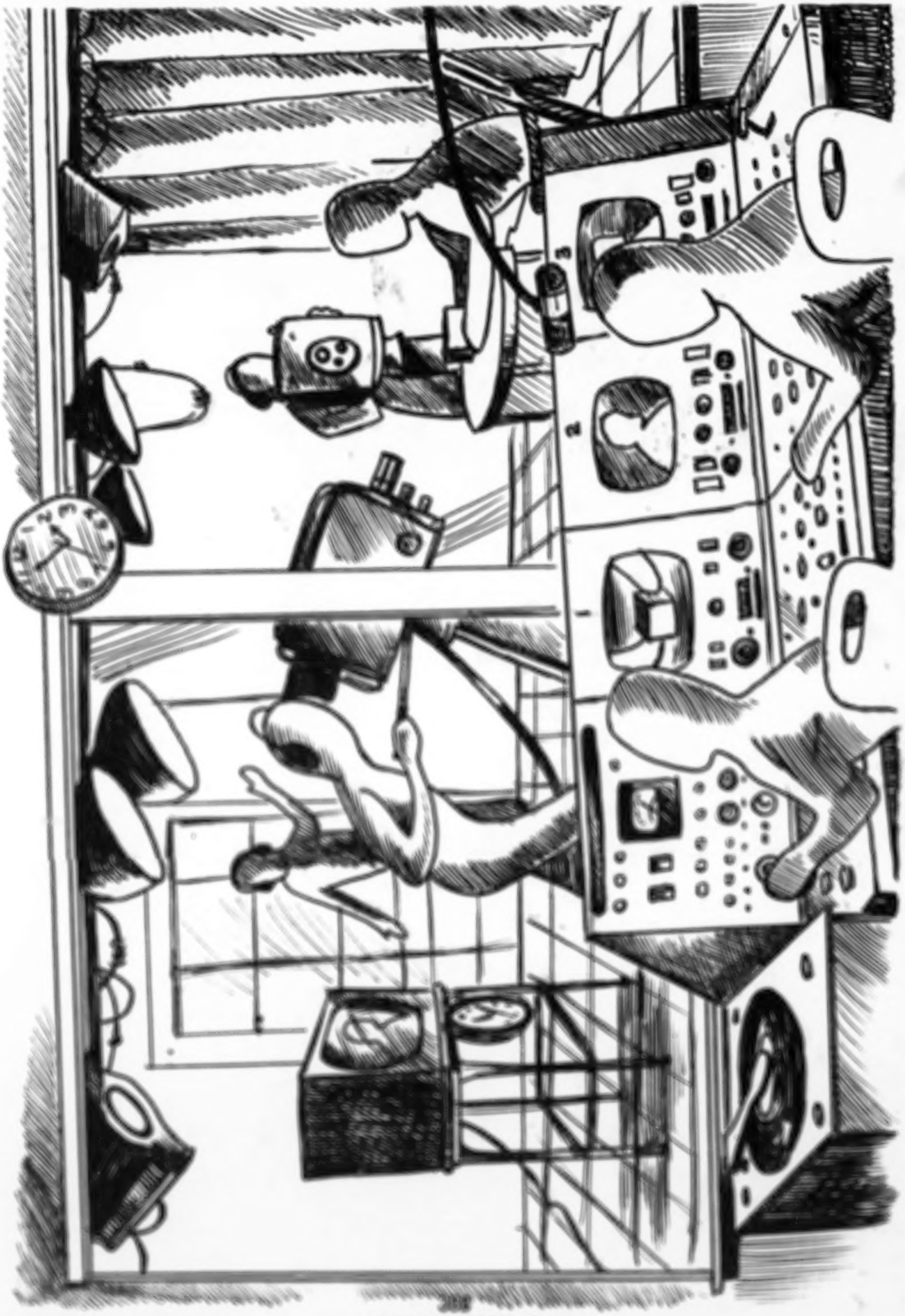


ILLUSTRATION 4

all of these features of the televised picture: video noise, depth of focus, brightness ranges in the scene, apparent texture of scene surfaces and tonal separation of scene colors.

A discussion of each of these follows this brief review of lighting terms.

a. Light output of lamps is measured in lumens. A new 500-watt general service lamp produces 9900 lumens, for example.

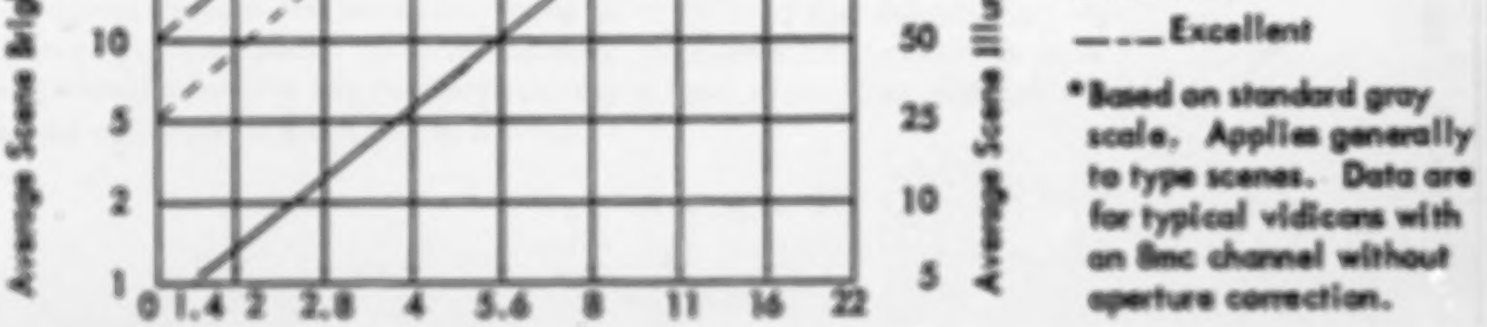
b. Illumination is an expression of the amount of light incident on a surface, usually measured in footcandles. The average illumination on a surface (footcandle level) is equal to the average incident lumens per square foot.

c. Brightness is measured in footlamberts, and is an expression of the light emitted from a surface by reflection, by transmission or by the direct generation of light. Numerically, the average brightness of a reflecting surface in footlamberts is equal to the product of the incident illumination in footcandles and the reflectance of the surface.

The first requirement of television lighting is that enough light reaches the vidicon's photosensitive surface to produce a signal that can overcome the video noise inherent in any television system. Within certain limits, increasing the amount of light focused on the photosurface increases the signal, or picture output, and increases the signal-to-noise ratio. There are three basic ways to increase the amount of light on the photosurface: increase scene brightness by using higher reflectance; increase the lens opening by adjusting the iris; increase scene illumination. Changing reflectances is not practical in many television applications, however. Increasing the lens opening by one f-stop doubles the effective light at the photosurface, but it also reduces the depth of focus. Many applications have depth-of-focus limitations that prevent a wide-open iris. Increasing scene illumination is usually a convenient and practical means of improving signal-to-noise ratio.

FIGURE 4

The Effect of Average Scene Brightness on Lens Opening and Picture Quality*



*Based on standard gray scale. Applies generally to type scenes. Data are for typical vidicons with an 8mc channel without aperture correction.

FIGURE 4 illustrates typical average scene brightnesses that are desirable for three ranges of picture quality over the range of available lens openings and scene reflectances. "Excellent" picture quality is characterized by a signal-to-noise ratio of about 14 to 1; this requires high illumination levels and comparatively large lens openings, but it is particularly important where fine detail must be observed in the picture. "Good picture quality is produced when the signal-to-noise ratio is about 8 to 1; some fine noise may appear in the video, but picture quality is generally suitable for many applications." "Noisy but usable" picture quality, with signal-to-noise at about 3 to 1, is just that; where fine detail is unimportant, it may be entirely satisfactory. (Signal-to-noise ratio is defined as the peak to peak signal amplitude divided by the (rms) noise amplitude.)

FIGURE 5 relates average scene brightness to the required f-number for the indicated picture quality. Some scene and system characteristics may produce vatiations from these data, but they serve as a useful rule of thumb. At the righthand side of the graph is shown the average scene illumination required to produce these results with a standard gray scale, or a scene varying from about 4 per cent to 80 per cent in reflectance.

Some television applications require that objects appear in focus over a considerable range of distance from the camera. The depth of focus becomes greater as lens opening is reduced, and the in-focus range can be altered somewhat by varying the distance for which focus is set. Obviously, the requirements for depth of focus set a minimum illumination level that is satisfactory for a given picture quality, since a smaller lens opening (for greater depth) increases the illumination required for a given signal-to-noise ratio.

A television system can reproduce detail in all portions of the scene only when brightness in the scene do not exceed a ratio of about 20 to 1. That is, the brightest scene areas where detail is required should be not more than 20 times as bright as the darkest shadow details. Exceeding this contrast range obliterates highlight detail or shadow detail, or both. Effective lighting helps to compress scene brightnesses to a range that can be accepted by the camera.

Differences in scene brightness are sometimes due to varying reflectances in the camera's field of view. With uniform illumination, the vidicon-type camera can accept reflected light ranging from about 4 per cent to 80 per cent of maximum incident illumination; a range of 5 to 75 per cent is probably more suitable. At other times, scene brightness differences are due to non-uniform illumination; some objects may be shaded from the principal light source. In some cases, parts of the scene may have shiny surfaces that reflect high light-source brightness directly into the camera. Brightness differences are most exaggerated when the high-reflectance areas have mirror-like highlights and the low-reflectance areas are in shadow.

FIGURE 5

LENS DEPTH OF FIELD CHART					
Lens Focal Length (Inches)	Distance to Object (feet)	f Numbers			
		f/2.8	f/4	f/5.6	f/8
1	11	8 to 17	7 to 22	6 to 51	5 to Inf.
	15	10 to 30	9 to 60	7 to Inf.	6 to Inf.
	20	12 to 60	10 to 400	8 to Inf.	6.5 to Inf.
	25	14 to 150	11 to Inf.	9 to Inf.	7 to Inf.
	50	19 to Inf.	14 to Inf.	11 to Inf.	8 to Inf.
	75	21 to Inf.	16 to Inf.	12 to Inf.	9 to Inf.
	100	23 to Inf.	17 to Inf.	13 to Inf.	9.5 to Inf.
	Inf.	30 to Inf.	21 to Inf.	15 to Inf.	10 to Inf.
2	11	10 to 12	9 1/2 to Inf.	9 1/3 to 14	8 1/2 to 15
	15	13 to 17	13 to 18	12 to 20	11 to 23
	20	17 to 24	16 to 26	15 to 30	14 to 28
	25	21 to 32	19 to 36	18 to 43	16 to 62
	50	35 to 87	31 to 126	28 to 200	22 to Inf.
	75	46 to 200	39 to 78	33 to Inf.	27 to Inf.
	100	55 to 625	45 to Inf.	38 to Inf.	30 to Inf.
	Inf.	119 to Inf.	83 to Inf.	59 to Inf.	42 to Inf.
3	11	10 1/2 to 11 1/2	10 to 12	10 to 13	9 1/2 to 14
	15	14 to 16	12 1/2 to 16 1/2	13 to 17	12 to 18
	20	19 to 22	18 to 22	17 to 24	17 to 25
	25	23 to 28	22 to 29	21 to 31	20 to 34
	50	42 to 62	40 to 78	36 to 80	33 to 107
	75	59 to 104	54 to 125	48 to 171	41 to 371
	100	73 to 160	65 to 500	57 to 395	48 to Inf.
	Inf.	268 to Inf.	188 to Inf.	134 to Inf.	94 to Inf.

Careful attention to lighting can help overcome scene brightness differences to reproduce details in the televised picture. First, an illumination level should be used that will give satisfactory picture quality. Second, directional lighting should be controlled so as to produce fairly uniform illumination with just enough non-uniformity to show the form of three-dimensional objects. Third, supplementary lighting should be used to "fill in" shadows where detail has been obscured. Fourth, light sources should be located so as to direct mirror reflections away from the camera; if this is not practical, the reflections may be made acceptable by using a large-area, low-brightness source such as a plastic panel lighted from behind by fluorescent lamps.

Lighting can help in the accurate depiction of scene textures, and, to some extent, the textures determine the character of the required lighting. With flat paints, wood, most textiles and other diffuse surfaces, any lighting combination that produces a satisfactory brightness range and shows the form of the subject will suffice. With shiny surfaces such as plate glass, mirrors or polished metals, lighting should be arranged to direct high-brightness reflections away from the camera; it may be desirable to include a diffuse-surface pattern in the scene to be reflected in the shiny surfaces to show their character. Semi-diffuse surfaces such as enamels and bright-finish metals require lighting equipment locations that reduce but not completely eliminate highlight reflections to the camera. This can be accomplished without much difficulty in most cases.

Monochrome television can separate only brightnesses; on the other hand, the human eye has the advantage of being able to distinguish between colors of equal brightness. Therefore, it is often necessary in black-and-white television to select light sources and scene colors that will produce differing shades of grey on the television screen. Satisfactory tonal rendering is not always critical, but in some cases it is necessary.

To reproduce various colors in their natural brightness relationship to each other, the use of tungsten filament lamps is usually quite satisfactory. Cool-white fluorescent lamps, commonly used in industry, have spectral characteristics that tend to brighten blue objects and darken reds, resulting in some distortion. Generally, this distortion is not serious. Mercury-arc lamps, however, possess a "line spectrum"; they produce light only in the blue, blue-green and green portions of the spectrum. As a result, television reproductions of blues and greens are fairly bright, but yellows are darkened, and oranges and red may appear as nearly black. If the scene is largely neutral in color, mercury lamps can be quite satisfactory.

Several factors determine the kind of light source and type of lighting equipment. Some of the advantages and disadvantages of each type are discussed here.

Filament lamps and equipment

1. Advantages
    a. Best tonal rendering.
    b. Equipment, wiring and switching are simple and comparatively inexpensive.
    c. Compact source permits good light control in spotlighting and floodlighting equipment.
    d. Equipment tends to be smaller in area per scene footcandle, and availability of high wattages may reduce number of units required.
    e. Output does not vary with ambient temperature.
    f. Projector and reflector lamps provide sealed-in reflectors that require no maintenance in dirty areas.

2. Disadvantages
    a. High source brightness may produce troublesome reflections.
    b. Radiant heat per footcandle is highest.
    c. Operating costs may be higher due to lower lamp efficiency.

Fluorescent lamps and equipment

1. Advantages
    a. Low source brightness reduces specular highlight contrasts.
    b. High source efficiency usually results in low operating cost.
    c. Lamp life is long, averaging at least 7500 hours in most cases.
    d. Well suited to general lighting applications.
    e. Low radiant heat per footcandle.

2. Disadvantages
    a. Compactness of source and controllability of light are less than with filament equipment – no "beams" of light available.
    b. In dirty locations, more maintenance is required to keep up lighting levels.
    c. Large fixture area required per footcandle.
    d. Circuits slightly more complicated than with filament.
    e. Extremes of ambient temperature can effect output greatly; with proper selection of equipment, however, this is no problem. Initial installation costs usually higher than for filament.

Mercury lamps and equipment

1. Advantages
    a. High source efficiency produces low operation cost and low heat per footcandle.

b. Source is small enough for good controllability.
c. High wattages may reduce number of sources required.
d. Long economic lamp life - about 6000 hours.

2. Disadvantages

a. Poor tonal rendering does not reproduce reds.
b. Operation at extremely low temperatures less effective than with filament units.
c. Lamps require several minutes warm-up for full brightness, and momentary power interruptions cut off light for several minutes as lamps cool and restart.
d. Flicker effect may be undesirable in viewing high-speed equipment.

All of these advantages and disadvantages must be weighed in the final selection of lighting equipment. In most cases, filament or fluorescent equipment will be the best choice. It might be commented that new fluorescent floodlighting equipment offers fluorescent sources that can be quite efficient in outdoor applications. Also, the integral-reflector filament lamps bear extra consideration in dirty areas.

Hagerstown, Maryland, uses vidicon cameras exclusively as studio cameras. It has been found that relatively high reflective surfaces enhance picture quality. Peg boards which have been painted with a semi-gloss paint, pastel colored surfaces and fabrics and other materials which have low light absorption qualities serve as excellent backgrounds for scenes. This reflective quality reflects light and, in effect, serves as a kind of back light and assists in making the subject (teacher or properties used in staging) stand off from the background. The type of clothing worn by teachers (appearing on camera) also is important in supplying sufficient contrast (without harshness) to the picture interest and quality. A mechanical writing tablet is used which employs an off white (pastel yellow) writing surface. A black chalk or writing material affords a harmonious contrast ratio in presenting written materials. These can be prepared on camera or pre-telecast. It is important to realize that a picture with moderate contrast, basically, is more preferred for (technological) transmission than black with few highlights. (The transmission of a black picture represents 100% modulation in standard television broadcast transmission.) It is to be emphasized that lighting for vidicon cameras does not parallel precisely techniques employed in (3 inch) image orthicon camera lighting.

References which are very helpful in establishing light in procedures are available, such as (1) Current Lighting Practice for Television Production,[1] Illuminating Engineering Society (I.E.S.), (2) Current Lighting Practices for Color Television Production,[2] I.E.S., (3) New Variable Color Luminous Studio Wall, Society of Motion Picture and Television

[1] "Current Lighting Practices for Television Production," Illuminating Engineering, p. 494, September, 1951.

[2] "Current Lighting Practices for Color Television Production," Illuminating Engineering, p. 624, December 1955.

Engineers (SMPTE),[1] (4) Lighting Lingo, SMPTE,[2] (5) "Television Broadcasting," (6) The NAB (National Association of Broadcasters) Engineering Handbook.[3]

TABLES 10 and 11 show the approximate costs for lighting various studio sizes, for monochrome or color. These costs may be interpreted as recommended lighting procedures, and custom lighting would modify such costs. Since vidicon cameras are relatively new and have not been used very extensively in studio (live) situations, little information is currently available for such lighting.

Hagerstown is using two types of lighting other than incandescent. Since filament type lamps radiate much infrared heat, air conditioning does not effectively reduce the heat generated by filament type lamps. Two considerations suggested an experiment with lighting, (1) reduction of studio heat problems for the comfort of personnel and (2) economies (power, replacement, reduction in air ventilation etc.) which would come about by the use of other lamps.

In experimenting with mercury lamps, General Electric type H400--RC1, it was determined that a 400 watt mercury lamp in a standard 18 inch scoop reflector (television studio item) supplied an equal amount of light to a 1000 watt incandescent lamp. The mercury lamp generates less heat than the same wattage incandescent lamp, and consumes only 40% as much power. The type H400 - RC1 mercury lamp is color compensated, and its spectral response is quite compatible with the vidicon pickup tube. (Filament type lamps have a spectral response which is more compatible with the image orthicon.) The mercury lamps are not used successfully with the image orthicon. The initial cost of lighting with mercury lamps is 1 1/2 times as high in cost as a similar installation for filament type lamps. However, due to the longer lamp life for mercury lamps compared to filament lamps, and the lower power consumption (65% of the operating cost of filament type lamps) the annual cost for the mercury lamp installation is 80% of the total annual cost for the filament type lamp. Transformers are required to operate mercury lamps (transformers with ballast are required) and a warm-up period of about 10 minutes is required before use (in order for the lamp to reach full illumination). It is necessary to allow about 10 minutes for the lamps to reach full illumination even if the lamps are turned off and on again immediately. Key, modeling and back lightin cannot be done effectively with this type lamp because of the lack of control or directivity of the light. It is suggested that such lighting be accomplished with standard television lighting (See TABLE 12).

Hagerstown has also experimented with fluorescent lighting. Another General Electric product, power groove lamps, type F96PG17/CW, were employed as a test situation for studio lighting.

[1] Rollo Gillespie Williams "New Variable Color Luminous Studio Wall," Journal of the SMPTE, pp 401-403, July, 1957.

[2] Lighting Lingo, SMPTE.

[3] A. Prose Walker (Editor-in-Chief), NAB Engineering Handbook, pp 6-72 to 6-102.

TABLE 15

	[illegible]		[illegible]		[illegible]	
	B & W	Color	B & W	Color	B & W	Color
Connector Strips & Wall Receptacles	$ [illegible]	$ [illegible]	$ [illegible]	$ [illegible]	$[illegible]	$[illegible]
Lighting Instruments & Accessories	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Switchboard Patch Panel	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Dimmers						
Cyclorama Rail	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total 2-wire System	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total 3-wire System	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Totals For Individual System Instead of Connector Strips 2-wire	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Totals For Individual System Instead of Connector Strips 3-wire	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
			ADD FOR ALTERNATE CONTROL SYSTEMS			
Patch Panel			[illegible]	[illegible]	[illegible]	[illegible]
Dimmer Panel			[illegible]	[illegible]	[illegible]	[illegible]
ST264-4/5/6 C-1 Thearon 3 Scene 30-3 KW Dimmers					or	[illegible]
ST264-4A C-Lector 3 Scene 72 circuits					[illegible]	
ST264-5A C-Lector 3 Scene 88 circuits						
ST264-7 C-1 Senior 3 Scene 24-3 KW Dimmers						
ST264-7A C-1 Senior 3 Scene 24-6 KW Dimmers						
ST264-8 Mag. Amps. 3-Scene 24-6.3 KW Dimmers						
ST264-9 C-Lector 4 Scene 132 circuits						
ST264-10 C-1 Thearon 3 Scene 60-3 KW Dimmers						
ST264-11 C-1 Senior 3 Scene 30-3 KW Dimmers						
ST264-11A C-1 Senior 3 Scene 30-6 KW Dimmers						
ST264-12 Mag. Amps. 3 Scene 30-6.3 KW Dimmers						
ST264-10A C-Lector 4 Scene 222 circuits						

By Permission. Century Lighting, Inc., 521 West 43rd Avenue, New York 36, New York.

TABLE 11

		[illegible]		[illegible]		[illegible]	
		B & W	Color	B & W	Color	B & W	Color
Connector Strips & Wall Receptacles		$ [illegible]	$ [illegible]	$ [illegible]	$ [illegible]	$ [illegible]	$ [illegible]
Lighting Instruments & Accessories		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Switchboard Patch Panel		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Dimmers		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Cyclorama Rail		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	3-wire System	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	2-wire System	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Totals For Modified System Instead of Connector Strips	3-wire	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	2-wire	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
				ADD FOR ALTERNATE CONTROL SYSTEMS			
Patch Panel							
Dimmer Bank							
ST264-4/5/6 C-I Theatron 2 Scene 30-2 KW Dimmers		14,100.00 or	14,100.00 or	14,550.00 or	14,550.00 or		
ST264-5A C-Lector 2 Scene 72 circuits							
ST264-5B C-Lector 2 Scene 90 circuits		5,278.00	5,278.00				
ST264-7 C-I Senior 2 Scene 24-5 KW Dimmers				26,000.00	26,000.00		
ST264-7A C-I Senior 2 Scene 24-6 KW Dimmers				or 32,250.00	or 32,250.00		
ST264-8 Mag. Amps 2 Scene 24-6.3 KW Dimmers				or 32,520.00	or 32,520.00		
ST264-9 C-Lector 4 Scene 150 Circuits				or 23,126.00	or 23,126.00		
ST264-10 C-I Theatron 2 Scene 60-2 KW Dimmers						30,000.00	30,000.00
ST264-11 C-I Senior 2 Scene 60-5 KW Dimmers						or 38,500.00	or 38,500.00
ST264-11A C-I Senior 2 Scene 30-6 KW Dimmers						or 40,200.00	or 40,200.00
ST264-12 Mag. Amps. 2 Scene 30-6.3 KW Dimmers						or 41,800.00	or 41,800.00
ST264-13A C-Lector 4 Scene 222 Circuits						or 17,670.00	or 17,670.00

By Permission. Century Lighting, Inc., 521 West 43rd Avenue, New York 36, New York.

TABLE 12

General Lighting Techniques and Procedures For Monochrome Operation[1]

Lighting Practice No. 1. The standard lighting procedure should be (a) to establish first a uniform over-all base light which will ensure proper camera operating conditions for technically good-quality pictures and (b) then to add carefully balanced effects light to obtain the desired artistic results.

Lighting Practice No. 2. Base light should be obtained from large-area diffuse sources arranged to produce a uniform illumination level through-out the set and from the viewpoint of all camera angles. The lighting level required will depend upon the camera tube. For example, with a type 5820 image orthicon camera tube, a lighting intensity of 75 ± 10 lumens per square foot, measured in a horizontal plane, is usually satisfactory. The vertical light intensity should be less than (1/2 to 1 times) the horizontal intensity.

Lighting Practice No. 3 To provide depth, to separate objects, and to add artistic interest to a picture, several types of effects lights should be added to the base light. Effects light may include key light, back light, modeling light, eye light, and special-effects light. In general these are best supplied from directional sources (usually incandescent) which can be conveniently adjusted in intensity, character, and coverage. Initial adjustments may be made with the aid of a photocell meter but final judgments should be made on a picture monitor.

Lighting Practice No. 4 Back light should be directed from the lowest possible rear angle with intensity between 1 and 1-1/2 times the base-light level. The light meter should be pointed toward the source of back light for this measurement, and all other sources of light should be turned off. Vertical type light is not back light and is to be avoided.

Lighting Practice No. 5 Modeling light should be directed from a side-front position and may be adjusted in intensity just to produce shadows. In general the amount of light required will not exceed 1/2 to 1 times the base-light intensity.

---

[1] By permission. Howard A. Chinn, Television Broadcasting, pp. 244-282.

Lighting Practice No. 6 Key light used to give the effect of a predominant source of light may be from 1 to 2 times the base-light level, with any base light from the same direction as the key light reduced accordingly.

Lighting Practice No. 7 Eye light may be added to brighten up a performer's eyes and to supplement the base light on close-ups. A small spotlight, mounted on the front of the camera and having an intensity of not more than 1/2 to 1 times the base light, is useful for this application.

Lighting Practice No. 8 Special lighting effects, such as spotlights, moon light and lights-out sequences, may be obtained by reducing the base light to approximately 1/4 its normal value, and any special-effects lights then adjusted to bring the total illumination level up to 1 or 1-1/2 times the normal base-light intensity (light meter aimed at camera positions).

Lighting Practice No. 9 Effects light directed to backgrounds to create window and similar shadows should not exceed 1-1/2 times the normal base light incident upon the background in question.

Lighting Practice No. 10 Self-luminous objects or areas such as exposed lamp bulbs, lanterns, and rear lighted windows should not produce a light meter reading in excess of 3/4 to 1 times the normal base-light reading, when the meter is held a few inches from the light source and directed toward it.

Lighting Practice No. 11 In monochrome transmission, incandescent light sources can be dimmed to one-quarter normal light intensity without impairing spectral response because of change in color temperature.

Lighting Practice No. 12 Lighting plans should be prepared in detail for all repetitive productions to ensure reproductibility of established lighting conditions.

Six lamps were mounted on each of two fixtures to achieve approximately the same light level as was obtained from five mercury lamps. The input power for the power groove lamps amounted to 2730 watts as compared to 2130 watts for the five mercury lamps. Power groove lamps do not require any warm up time; they are convenient to use and are less expensive to operate. Heat generated from power groove lamps is less than that from mercury lamps, the cost (compared to filament type lamps and fixtures for the same illumination over an equal area) is again 1 1/2 times, original cost. The annual operating cost is about 50% of the cost of filament type lighting. The color characteristics of the power groove are more favorable than the mercury lamp for the vidicon. Transformers and ballast are required. Transformers should be located away from the lamps to reduce audible hum in the studio staging area.

Scenes ordinarily need limited amounts of filament lighting to achieve artistic effects accomplished in key, modal and back lighting. Filament lighting allows the use of dimmers (for monochromatic telecasting), whereas the fluorescent and mercury lamps discussed are not used effectively with dimmers.

STUDIO TECHNICAL FACILITIES must meet rigid requirements. Professional educators strive to achieve proficiency and perfection in their responsibility to the community and society. In keeping with their ideals and integrity, educational television likewise must be its best. The success of any communication process relies on three elements (1) the originator, (2) the medium (or media) and (3) the receiver or audience. The influence the message imparts to the communicant or audience is important. To communicate means to be understood; to educate means to influence. In order to make certain the greatest influence (impact) is achieved, the most proficient instruments must be employed. It is with these realizations that the educator must proceed with the instrumentation of his television development that he may commence with a simple arrangement but include appropriate design to allow him to move to the more complex without loss of investment, flexibility and efficiency. The minimum standard for an educational television operation should be professional equipment. Professional equipment is required to achieve "Standards of Good Engineering Practices" as is required in broadcasting established and agreed upon by the FCC and the National Association of Broadcasters (NAB).[1] These standards do not represent the maximum achievable, but represent standards acceptable to design engineers and broadcasters, and represent the present (technical) state of the art, relatively. The entire broadcast manufacturing industry has geared its production to meet or exceed these requirements, likewise, conventional television (broadcast) transmitters, receivers and associated equipment performance reflect this state of development. Specialized equipment is available for meeting higher standards, but due to production and engineering costs, the price of such instruments may be prohibitive.

Nearly a unanimous opinion among educators using television is to list minimum studio technical equipment requirements as follows:

1. Two professional live cameras per studio are a minimum.

---

[1] A. Prose Walker (Editor-in-Chief), NAB Engineering Handbook, Part 12, pp 8-215 to 8-249, Part 13, pp 8-250 to 8-253.

a. Each studio camera should be equipped with a viewfinder, a lens turret (or vari-focal lens), mechanical focus, a firm but maneuverable tripod on dolly, a two-way talk system via headphones and microphone between the cameraman, director and camera control positions. One fixed (no viewfinder camera) and one moveable camera with viewfinder is sometimes used for the first installation.

b. The video output of the cameras should be non-composite without synchronous (sync) pulses for switching from camera to camera most effectively.

c. The cameras may be image orthicon or vidicon. Scene lighting requirements and effects lighting practices are dissimilar; results from either cameras can be of standard quality.

2. Camera control equipment must be operated from remote location outside the studio. This equipment may be located some distance away but usually is adjacent to the studio. The camera control (and master monitor or line monitor) should include both picture monitor and wave form monitor (for obtaining proper signal quality and level).

3. A video switcher with fader, lap and dissolve facilities to switch from one camera to another, superimpose one picture over the other, a means of dissolving a picture etc., with a provision to add sync after switching.

4. A standard sync generator (which meets specifications established and referred to as EIA sync, built by manufacturers of professional television equipment) should be employed to develop a standard video signal which can be distributed to

a. Broadcast transmitters.
b. Videotape recorders.
c. Microwave transmitters.
d. Closed-circuit radio frequency distribution systems employing multiple channels.
e. Electronic video mixing amplifiers and switchers.
f. Other video studios (intra-institutional) where a common sync generator is employed.
g. Stabilizing and other video distribution amplifiers.

5. A television film chain which operates from the same sync generator so that film, slides, overlays, opaques etc. can be shown in conjunction with the live studio cameras in presentation of materials with ease.

The purpose in listing the minimum equipment is meant to emphasize and denote the standards of performance. The nature and sope of the programming will establish total equipment requirements. Ventilation, air conditioning, dust control, power requirements and preventitive measures to protect personnel and the equipment from operational hazards must be included in space and technical facility planning. The kind and quality of test equipment are somewhat optional in consideration of the ability of the technical staff and manufacturers service arrangements which can be negotiated. Minimum test and maintenance equipment should include an oscilloscope capable of measuring and indicating all aspects of the pulse timing and widths of an EIA sync generator, a vacuum tube voltmeter, tube tester, video sweep generator, and such additional equipment the staff feels is required to maintain the technical proficiency of the equipment in use. Such considerations as availability of parts from local sources, spare parts kept on inventory, spare operational equipment like a second (stand-by) sync generator, spare cameras and other equipments available for replacement service influence the quantity and kind of test and maintenance equipment recommended. Further, often times technical equipment is shared by institutional departments (Physics, Chemistry, Engineering etc.) and with broadcasters (commercial and/or educational) or industries in the area which will share test equipment. Professional camera performance for monochromatic service should include specifications as (1) 525 scanning lines interlaced 2 to 1, (2) 30 frames, 60 fields per second, (3) external sync drives from a standard sync generator (horizontal, vertical, blanking and composite signals), (4) gamma correction and (5) 75 ohm output impedance. Aside from differences in the individual camera chains (vidicon and image orthicon monochrome cameras), other professional equipment associated with studio equipment are interchangeable or identical. See ILLUSTRATION 5.

The total difference in cost then between a studio equipped with vidicon or image orthicon (I.O.) cameras is the difference in the cost of the respective camera units. An I.O. monochrome camera costs approximately 1 1/2 to 2 times as much as a professional monochrome vidicon camera. The relatively new monochrome I.O. cameras which employ a 4 1/2 inch tube costs considerably more than the standard I.O. camera which uses a 3 inch pick-up tube.

Professional vidicon cameras consistently reproduce 575 to 600 vertical lines at the center of the picture (as measured on a standard EIA test pattern chart for camera alignment procedures), somewhat less in the corners, and a good gray scale with 200 to 250 foot candles of (incident) studio lighting. At this lighting level some fine grain noise can be noted, and in some cases of extreme contrast and fast camera movement (pan motion), lag is noticeable. Lag and fine grain noise problems can be reduced to a great extent by proper lighting (for a lessor contrast). Since the professional vidicon cameras will attempt to produce the complete range of grays displayed in any scene, it is important to have high light and shadow areas limited to something in the order of a ratio of 20 to 1. This can be conveniently accomplished by lighting an EIA gray scale card to the light level to be used, set up the camera to reproduce the gray scale with blacks at approximately 10 IRE (Institute of Radio Engineers standards) units and whites at approximately 100 IRE units. The "A" scope (of the camera control unit) can be used along with the cameras as a spot photometer to achieve the 20 to 1 ratio. The vidicon does not compete too well with the 3 inch

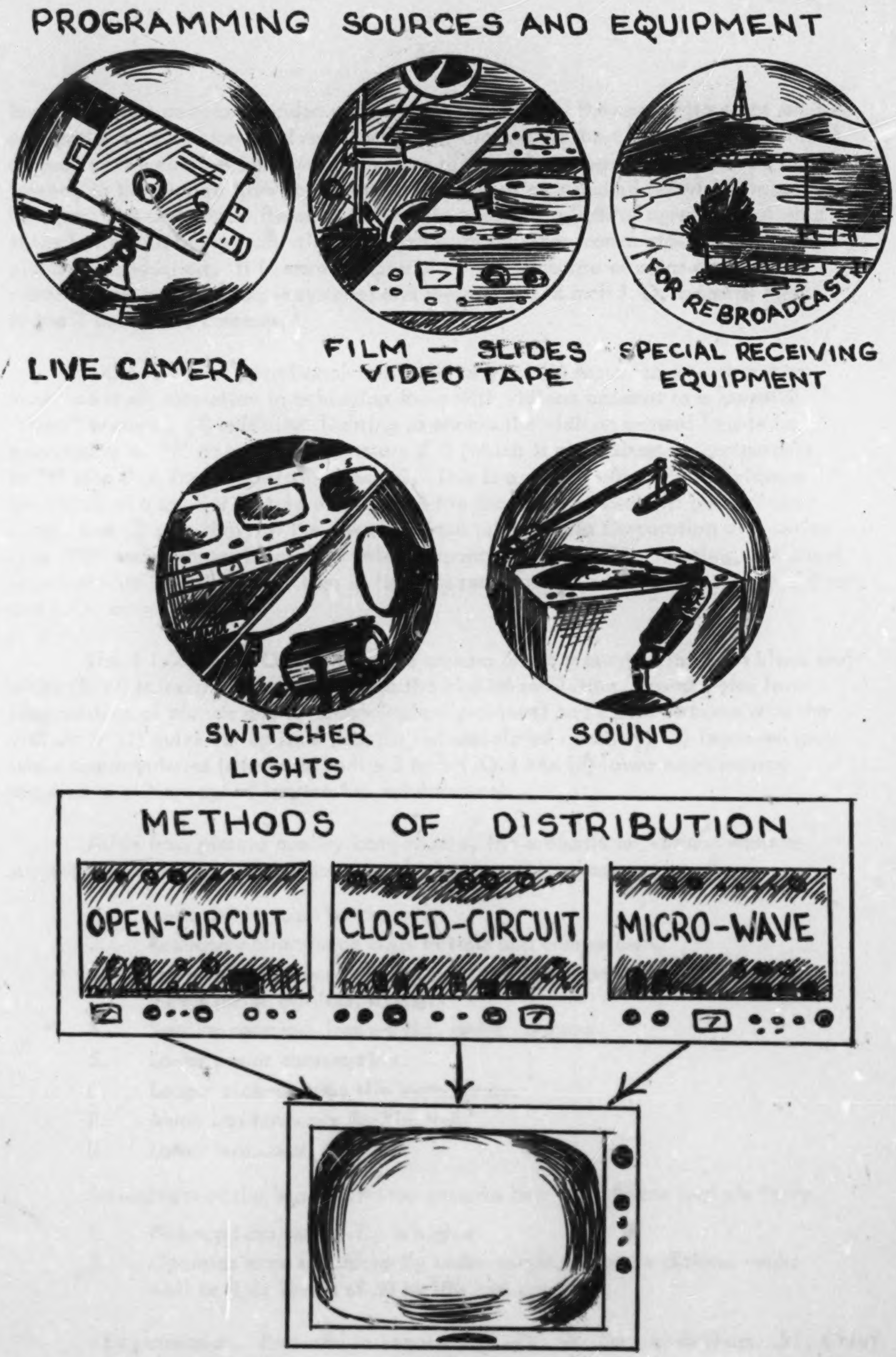

PROGRAMMING SOURCES AND EQUIPMENT
LIVE CAMERA
FILM — SLIDES
VIDEO TAPE
7
FOR REBROADCAST
SPECIAL RECEIVING EQUIPMENT
SWITCHER
LIGHTS
SOUND
METHODS OF DISTRIBUTION
OPEN-CIRCUIT
CLOSED-CIRCUIT
MICRO-WAVE

ILLUSTRATION 5

image orthicon camera on video monitor comparisons. If the comparisons are made on conventional television receivers (such as monitoring off the air), the relative merit of each of the cameras becomes much more difficult to recognize. There is a difference in the picture from each of the two cameras on standard television receivers, however, the apparent difference may be the result of a lack of agreement of what is the better picture reproduction. To many, the vidicon comes closer to correct picture reproduction. It is more comparable to the response of color cameras (as monitored on monochromatic systems) and the new 4 1/2 inch I.O. cameras then to the 3 inch I.O. cameras.[1]

Other areas of operational considerations are (1) focus (camera operators must use much discretion in achieving focus with vidicon cameras to accomplish "sharp" pictures, (2) sufficient lighting to enable the vidicon camera lens to be operated at an "f" stop of approximately 2.8 (which is approximately comparable to "f" stop 8 on image orthicon cameras). This is a point in favor of the vidicon (by virtue of a smaller picture diagonal on the face of the mosaic of the vidicon tube), and (3) sensitivity of the newer vidicon tubes (Radio Corporation of America type 7039 and General Electrodynamics Corporation type 732[illegible]). Further, technical improvements including reduction in lighting requirements can be expected in vidicon and I.O. cameras.[2]

The 4 1/2 inch I.O. monochrome camera is the present ultimate in black and white (B/W) television cameras. It has the highest resolution, lowest noise level (degradation of picture due to technological problems) and shares features with the vidicon in (1) quick set up time (stability of associated circuitry), (2) improved gray scale characteristics (compared to the 3 inch I.O.) and (3) lower maintenance requirements (time out of service for maintenance).

Aside from picture quality comparisons, the professional vidicon camera suggests some distinct advantages over the image orthicon camera.

1. Lower initial cost for the unit.
2. Reduced maintenance costs in time and components.
3. Lower replacement costs for the light sensitive pick-up tube (vidicon versus image orthicon tubes).
4. Smaller cameras, less weight, easier to move.
5. Lower power consumption.
6. Longer pick-up tube life expectancy.
7. Much less tendency for "burn-in".
8. Lower lens costs.

Advantages of the image orthicon cameras over the vidicon include these.

1. Pick-up tube sensitivity is higher.
2. Operates more satisfactorily under varying light conditions; works well at light levels of 50 to 100 foot candles.

[1] By permission. Prepared in cooperation with Mr. Edward Graham, Jr., Chief Engineer WGTV, University of Georgia, Athens, Georgia.

[2] Ibid.

3. Is less critical of lighting requirements to provide a better signal to noise ratio (in picture comparisons) with higher resolution.
4. Is not subject to picture corner focus problems as is experienced with vidicons.
5. Less difficulty in picture shading (edge flare).

The video signal can be recorded by either of two methods, (1) film or (2) tape. Each plays an important role in the technical operation. Recordings allow many possibilities in programming, schedule management, reuse of the program, distribution over wide areas by duplicating the recording, and reuse of segments only as deemed profitable and practical. Other distinct advantages suggested are a study of the production techniques and a relative measure of equipment performance.

Recording requirements in television operations continue to be popular necessities. With the development of the videotape recording process much flexibility and reliability have been established. However, many institutions find film recording very successful and convenient. Oftentimes a tape recorder is used for recording television programs, editing and other refinements are performed; then the program is transferred to film. Two major manufacturers now market professional videotape recorders. Development designs have been completed and prototype models have been exhibited for a smaller, less expensive and more flexible type videotape recorder which will be marketed. Early reports suggest that the new version will be adaptable for schools and institutions to record from off-air pickups or closed-circuit systems for delayed playback and reuse as desired. Such a development will offer much more flexibility in program management.

Two types of 16 millimeter film kinescope recorders have been used extensively. The professional type is complex in circuitry and involves specialized equipment. A less expensive model utilizes a modified Auricon camera or equivalent with a standard video display device. Aside from the necessity of using professional studio equipment, extreme care in lighting and film processing, the kinescope can fulfill many requirements of recorded programs. A professional paper describing a film recorder is available from the Society of Motion Picture and Television Engineers, Volume 68, Number 7, July 1959.[1] The paper was prepared by William O. Crusinberry and Leslie P. Greenhill, and was presented on October 23, 1958, at the Society's Convention in Detroit, Michigan.

Engineering practices for Videotape Recording Television Studio Equipment, Kinescope Recordings, and Motion Picutre Filming are available from the National Educational Radio Television Center, University of Michigan, Ann Arbor, Michigan. These reports are available to interested parties upon application.

Educational television operations have not, at this date, had much experience in the field of color equipment except in medical installations. The need for color in other than medical uses seems important and maywell be implemented in general instructional situations in the relatively near future. Experiences reported from color operations indicate that the technical staff which is capable of their tasks in monochrome service can adjust quickly and proficiently to color telecasting. Costs are higher for technical equipment; lighting and test equipment requirements are greater.

[1] W. O. Cruisinberry, L. P. Greenhill, Authors, "A New Moderately Priced, Practical Television Film Recorder" Journal of the Society of Motion Picture and Television Engineers, Volume 68 No. 7, pp 472-475.

Most other personnel and space requirements are similar to monochromatic operations. There is little doubt that color transmission enhances interest and aesthetic value of telecasts.

Technical developments of an educational television operation should include provisions for simultaneous activities. See ILLUSTRATION 6.

Distribution facilities

1. Broadcast of one or more programs (via multiple transmitters).
2. Rebroadcast programs received from microwave or closed-circuit (remote local or remote institution) origination.
3. Distribute via closed-circuit, microwave and open-circuit, origination by local and/or remote sources.
4. Delay via videotape or kinescope recording for rescheduled distribution.

Studio origination facilities

1. Live studio(s)
2. Video tape, record and/or playback.
3. Kinescope recording and film playback.
4. Remote and/or studio origination for local and/or inter institutional use, for immediate or delayed distribution.

Studio equipment can be made portable to the extent that (1) the equipment can be moved from area to area within a building, or (2) installed in a truck or van so as to provide mobility from one place to another. A mobile unit of this sort usually employs the truck as a semi-permanent arrangement for all equipments associated with the studio control; the camera cable and microphone lines are extended from the truck (or mobile unit) to the working area or studio set. Power for the operation of the televison equipment is necessarily supplied from nearby power sources such as transformer vaults (within buildings) or utility (power) lines available. Portable power plants such as combustion engines to drive generators are available but add to complexities. The electric power load for a mobile unit may well approach 10 kilowatts. See ILLUSTRATION 7.

Portable or mobile equipment adds to program flexibility. This offers the opportunity of originating telecasts out of the regular studios. This flexibility comes with certain compromises. The problems encountered in such activities are (1) adequate lighting in the areas where telecasts are to originate, (2) inability to control acoustics of the areas used, (3) hazards of limited or restricted space for camera movement, (4) time (man hours and accessability of area) requirements to assemble, move and organize the physical equipment preceding and following the activity, (5) the loss of use of equipment while in transit, (6) heat and ventilation control and (7) increased maintenance of equipment due to the rigors of additional wear and tear of mobile equipment. It is to be stated that most educational television operators prefer fixed studio areas where control of the physical problems can be optimized.

Through simultaneous use of various facilities, several activities can operate concurrently. Utilization of facilities in such a manner enhances the economical feasility of television services.

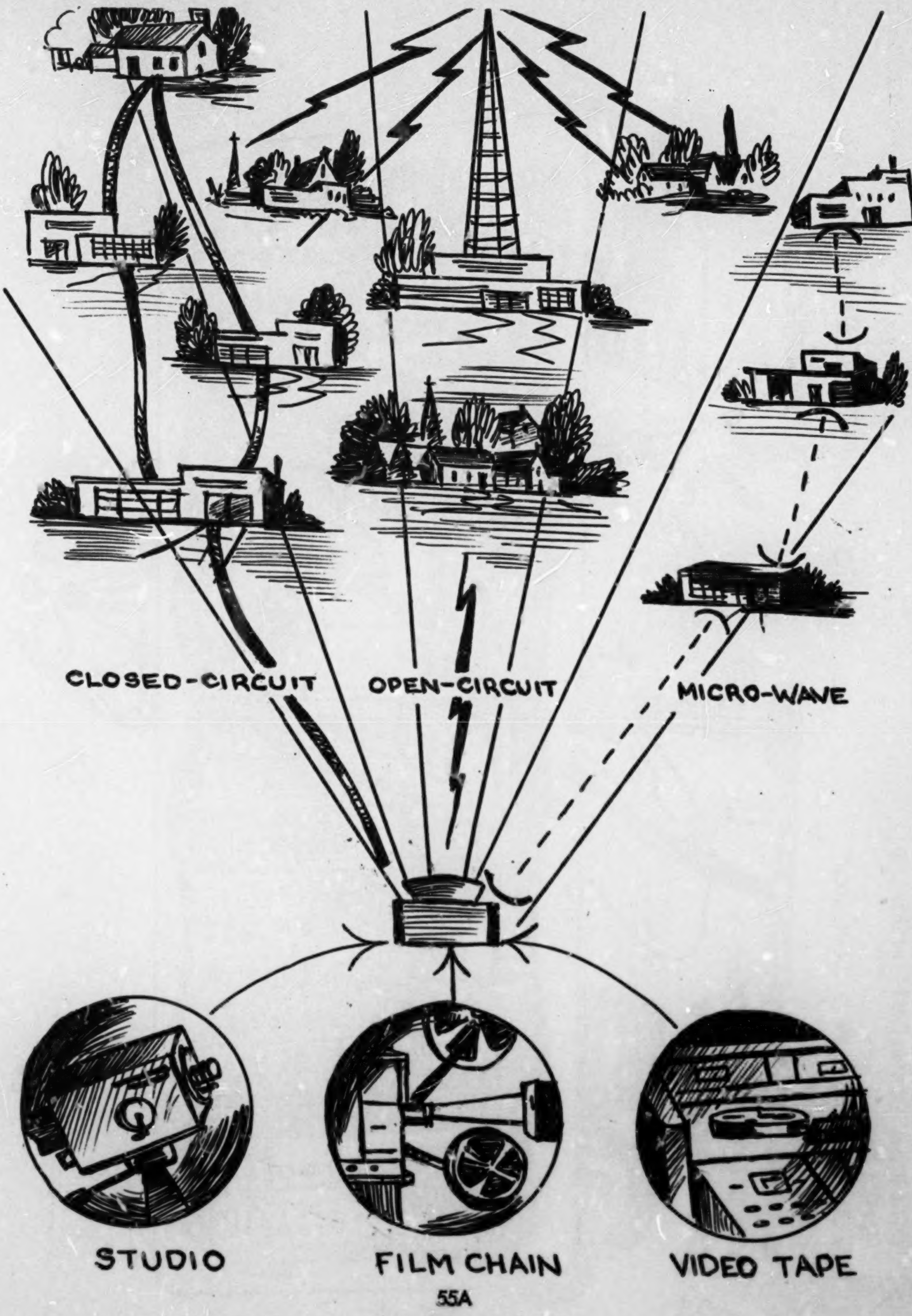
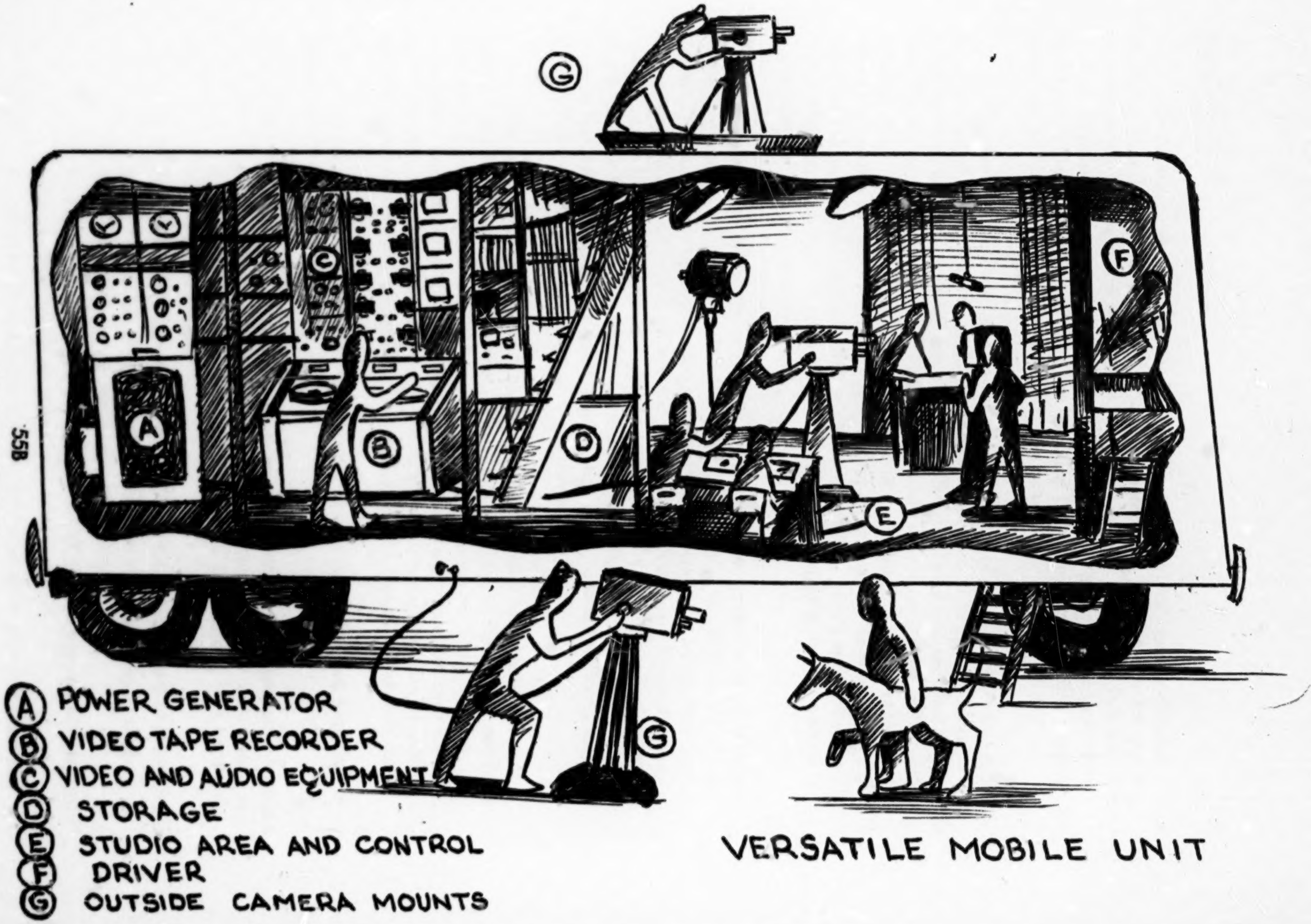

CLOSED-CIRCUIT
OPEN-CIRCUIT
MICRO-WAVE
STUDIO
FILM CHAIN
VIDEO TAPE

ILLUSTRATION 6


G
A
B
C
D
E
F
G
Ⓐ POWER GENERATOR
Ⓑ VIDEO TAPE RECORDER
Ⓒ VIDEO AND AUDIO EQUIPMENT
Ⓓ STORAGE
Ⓔ STUDIO AREA AND CONTROL
Ⓕ DRIVER
Ⓖ OUTSIDE CAMERA MOUNTS

VERSATILE MOBILE UNIT

ILLUSTRATION 7

PERSONNEL

Opinions among educators indicate personnel selected usually determines the amount of success of an educational television operation. Seldom are the achievements of an operation accrued to the efforts of an individual; rather, it is an expression of the activities of a number of people. This is best characterized by the "team approach," logically referred to as the teaching team and expresses the cooperative effort demanded of the studio and classroom teachers.

The teaching team represents the teaching staff of the operation and requires coordination of all abilities to mold the resultant telecast into dynamic form. Most administrators feel the organization of the successful television operation begins with the wise choice of an area within an institution whereby many of the influential leaders are directly associated or affiliated with the operation. This enhances the use of the wealth of resources within the institution and serves as an excellent public relations activity within as well as outside the operation. Each and every function of the operation will tend to take on the "cloak" of the influence represented in the administrative unit which directs it.

A description of the technical equipment and the standards of achievement deemed necessary for the professional work of educators in this field has been outlined. The technical staff to service, maintain and operate the equipment must have a sincere interest in the efforts and purposes of educators. Likewise, they must have the knowledge and dexterity of performing the function of being master of the electronics subservient to the communication process at work. The methodology of selecting, assembling, maintaining, servicing, and extending a facility to its fullest potential is the charge of the technical staff.

The person responsible for technical equipment must know how to select, develop and train necessary assistants. He must know how to muster top performance from his subordinates and facilities and meet the challenge on every telecast. An appreciation of the television arts, sound judgements in provocative matters and a temperament conducive to a harmonious relationship with personalities of various extremes are the personal characteristics required of the tehcnical administrator.

The technical requirements of this administrator are broad and include the following:

1. A thorough training and experience in electronics (a graduate engineer or approximate equivalent through extensive experience in electrical engineering, broadcasting and associated fields along with academic training).
2. Knowledge of current practices in broadcast (television) engineering.
3. Ability to build, modify and/or maintain electronic equipment associated with television (and broadcasting).
4. Necessary licenses (as required by the FCC) to carry out his responsibilities as technical director.
5. Association in or affiliated with, professional engineering associations.

Staff subordinates to the technical operation must have the many personal characertistics described as required of the administrator of the technical operation. Technical qualifications are met through a less rigorous training and experience than for the technical administrator. Programs as offered by vocational electronics programs, trade and technical schools and miliary service (electronics) training are often sufficient background and training for technical assistant staff positions.

Since industry and service organizations extend the market for such skilled technicians, the need for such people is higher than the supply. One of the requirements of educational television operators is a larger supply of qualified technical people. The precise quality and quantity of technical training required is not easily defined. Proficiency in basic sciences, ability to use hand tools as well as test instruments and ability to comprehend electronic circuity functions are the overall qualifications sought in technical subordinates. These, along with a zeal for education and television, are the prequisites.

Studio teachers-professors must follow a general philosophy of teaching.[1] Too often materials, tools, and instruments made available to teachers by artists and technicians are misunderstood and subsequently, misused. This statement applies to books, magazines, charts, graphs, television and many more. The dilemma of the teacher using television, then, is the "how" of advantageously utilizing this new and powerful tool with its inherent strengths without turning one's back on proved, sound principles of education. Before television can be effectively used by a teacher, he must know in what terms he must couch his thinking. He must have his feet on the ground while extending his thinking toward infinity. He must have firm ideas about teaching and methods.

A dictionary definition of "method" is "an orderly procedure of process, hence, a set form of procedure, as in investigation or instruction." This information is adequate for a crossword puzzle, but it tells only a vague side of what the terms "method" actually implies. Its uninclusiveness is akin to the error in diction of interchangeably using "eager" and "anxious". These words are not synonomous, and as "anxious" implies worry and concern beyond eagerness, "method" implies more than procedure. It includes taste and, at times, morality.

But before one thinks of "how" he should ask "why?" The "why" tells much and cannot struggle against its absorption into the humanities. Here the term "humanities" is used as the Romans used it; that is, respect for human personality and human relationship. Before one attemps to consider how to use such a potent mass communications instrument as television he should try to equate it with the humanities. This keeps his feet on the ground before he is required to extend himself further than he has gone before.

Wealth in teaching comes from knowing that a student's thoughts are pouring out, that he is not merely, as Shakespeare has Cassius say in Julius Ceaser, conning by rote to be used later. One of Sherwood Anderson's little tales in Winesburg, Ohio, is called "The Teacher." "Once," writes Anderson of Kate Swift, the teacher, "she talked to the children of Charles Lamb and knew all the secrets of his private life. The children were somewhat confused, thinking Charles Lamb must be someone who once lived in Winesburg." This is the role of the teacher, regardless of the instrument by which he reaches his audience. Kate Swift restored literature to life. She approached the book (or television) through experience, to be tested by the truth of the human mind, heart, and imagination, the final warrants of reality.

---

[1] Proposed Guidelines for Teacher Education Institutions in the Use of Television, pp 4-10, November 1957.

With the preceding paragraphs as a discussion of education's obligations, the following paragraphs will explain the many facets of television in helping meet these obligations.

This philosophy must be applied when television is utilized. What are the duties of the teacher in the studio? The first year the teacher undertakes to deliver a course by television, it is desirable that he be relieved of all other teaching responsibilities. The new demands on time and planning and of learning how to take fullest advantage of his new instrument require his full attention. There is no short cut to familiarity; and familiarity brings dynamic utilization.

However, as this knowledge of rudimentary tasks grows, time can be devoted to other work. By its very nature, television teaching requires more planning than traditional teaching; therefore, time for creating should never be usurped 'less lessons become static and canned. A film shown by television can be effective and is at times important and necessary. But this does not fully utilize the (television) medium. The teacher must have time to bring material up to date, to revise, to extend, to prune. After the first year, time can be devoted to other duties. A natural step for the studio teacher to take after the first year is toward production and direction. Working in these areas provides more of this familiarity which improves utilization of the instrument. In addition these added responsibilities help solve some of the economic problems. Other duties for the studio teacher who completes his first year include researching other fields, graphics and sets designed by art teachers, and musical help, where appropriate, from the music teacher. On the elementary and secondary levels the teacher cannot function effectively with other teaching responsibilities. See ILLUSTRATION 8.

The duties beyond teaching that the studio teacher can assume are in direct proportion to the hours on camera per week. Each hour on camera requires 6-8 hours in preparation. This does not include time spent by those who reinforce the teacher. This will be covered in a later paragraph. This is the length of presentation which is dependent on two factors: (1) student age level and (2) nature of the subject. Courses which involve students in activities such as music and art can be longer (on elementary level) than those which do not involve and are more factual in nature. When students are involved in lessons by physically engaging in activities, the lessons can be longer. A rule of thumb, all things remaining equal, is that the older the student, the longer the period of concentration. Special programs should receive individaul consideration.

The factor of extra pay for teaching before a camera is one of a very delicate nature. When this question is discussed the wealth of a school system, the policy of the institution, and the definition of "pay" must be considered. Therefore, no one panacea seems to apply to all situations; but some sort of remuneration is essential

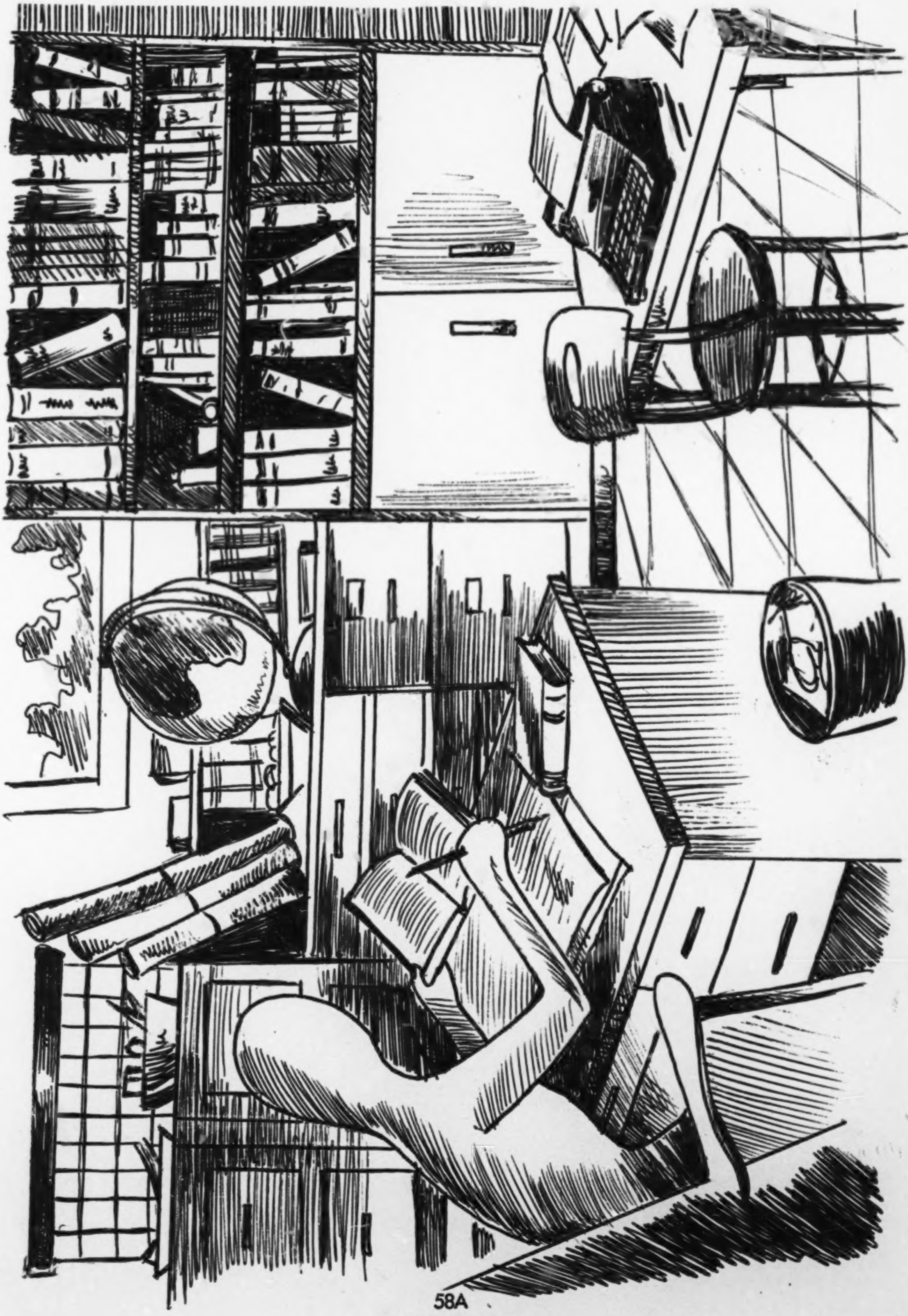


ILLUSTRATION 8

to attract sufficient number of teachers to compete for each assignment. This permits a choice and, theoretically, will produce the best teacher. Remuneration can be in one or a combination of the following:

1. Teaching fewer hours a day (even to less than one).
2. Residuals from the sale of kinescopes and/or video tape recordings.
3. Residuals from the sale of courses of study.
4. Summer pay for conducting workshops.
5. Higher salary scale based on the nature of the work.
6. Higher salary for functioning as a director or producer in addition to teaching.

Before deciding on a method of remuneration, an institution must take cognizance of its impact on the "team approach." A basic high salary for an on-camera teacher immediately attaches a premium to televised teaching. This can open a serious rift between studio teachers and classroom teachers. It can be a wound that absesses, not heals, with time. It can destroy the initiative in the classroom and this greatly influences the effectiveness of a televised lesson within that classroom. Any of the remaining five seem to the classroom teacher to be less offensive methods of reimbursement.

Feedback, the evaluation of content, style and packing, is an element some few professionals chide. If feedback is to be considered only a student reaction, perhaps it is overemphasized. But feedback embraces more than this, and it is of paramount significance in daily or semi-weekly instruction. The actor on stage, the musician, the classroom teacher, the film actor, the public speaker, the preacher, all have feedback which helps establish the necessary rapport with the audience. Television teaching is not an exception. However, there are many ways to get feedback of which the following list is by no means complete.

1. By personal evaluation of kinescopes and video tapes.
2. Through teacher and pupil evaluation of chosen lessons.
3. By help from a competent director, producer and floor manager.
4. By visiting classrooms during telecasts.
5. Through constructive criticism by colleagues.
6. By infrequent inclusion of students within a television lesson.

Too often the feeling that no feedback is necessary breeds the complacency of ineffectiveness.

Since the creating and delivering of a precise television lesson is time consuming, the teacher needs much assistance in other important aspects of the lesson. Idealistically he needs professional lighting and staging crews, professional directors and floor managers, pro-artists, skilled technicians, and professional cameramen. Each has his special contribution to make, and his skill requires much study and the time to develop. However, budget considerations reduce this to realism. It is difficult to place a value on the added help professionals can give a lesson beyond the work of eager and interested amateurs. Perhaps it's bad business to consider the professional, with the exception of needed technical assistance for good television. After a certain quality is attained, the cost of improving it rises sharply. If the image on the screen is intelligible, of reasonably good composition, and the audio is clear and clean, why pay thousands of dollars to increase each 5 to 10%? The analogy of the jeweled watch seems to apply here. If the 17-jewel watch keeps accurate time, why pay more for a 21-jewel watch? The question to be asked is, "Is the task that has been defined being adequately accomplished?" Of course there are those who still will buy the more expensive watch; twenty-one is a higher number!

Communication specialists are important in the operation of educational television facilities. There is no one who challenges his pre-emminent position. This is the "communicator." Because of his special skill, he is able to translate a given body of material into a form which makes it live. He (perhaps this person is still a myth) knows how people think and learn - he knows the sequence of points to be made; he knows the inherent strengths and consequent weaknesses of the medium; he is the "how" man on the staff. One with these qualifications could improve lessons far beyond the lighting man's skill with a light meter.

Talented graphic artists are essential to any operation. The highly critical nature of TV, the microscopic view, demands visual representations to be of high quality. A simple page number unskillfully scrawled on a card can be distracting. Weak drawings, hastily made diagrams and models, poorly composed and contrasted photographs and unattractive charts and graphs lose a properly made point. Visual representations must corroborate, reinforce or substitute for verbal explanations without detracting from what is said. Therefore, there can be no compromise with non-professional work. This does not imply that the artist need be a trained and expensive professional artist. It does mean that each project must be carefully executed. The type of person needed can usually be found in every community, even in the high schools and colleges. The key words with respect to graphics presented on TV are exactness and taste. See ILLUSTRATION 9.

With respect to other assistance needed by a studio teacher such as directors, floor managers, production personnel and others, extreme care must be exercised to insure that any help rendered improves each telecast without stifling the creativity of the teacher. The delicate balance of "give and take" should always answer to the "value and quality" of the end product.

The preceding paragraphs have dealt with factors which contribute to optimum use of facilities and personnel at the point of origin. Not to be neglected are conditions for viewing, exclusive of physical factors, within classrooms.

When the team approach is used in a televised teaching situation, the classroom teacher's role, contrary to the thinking of many, becomes more significant than in a traditional classroom situation. He must (1) conform to a course of study without losing his initiative and identity, (2) adapt the material without falling into a pattern which simply recapitulates, (3) view television as a supplement and

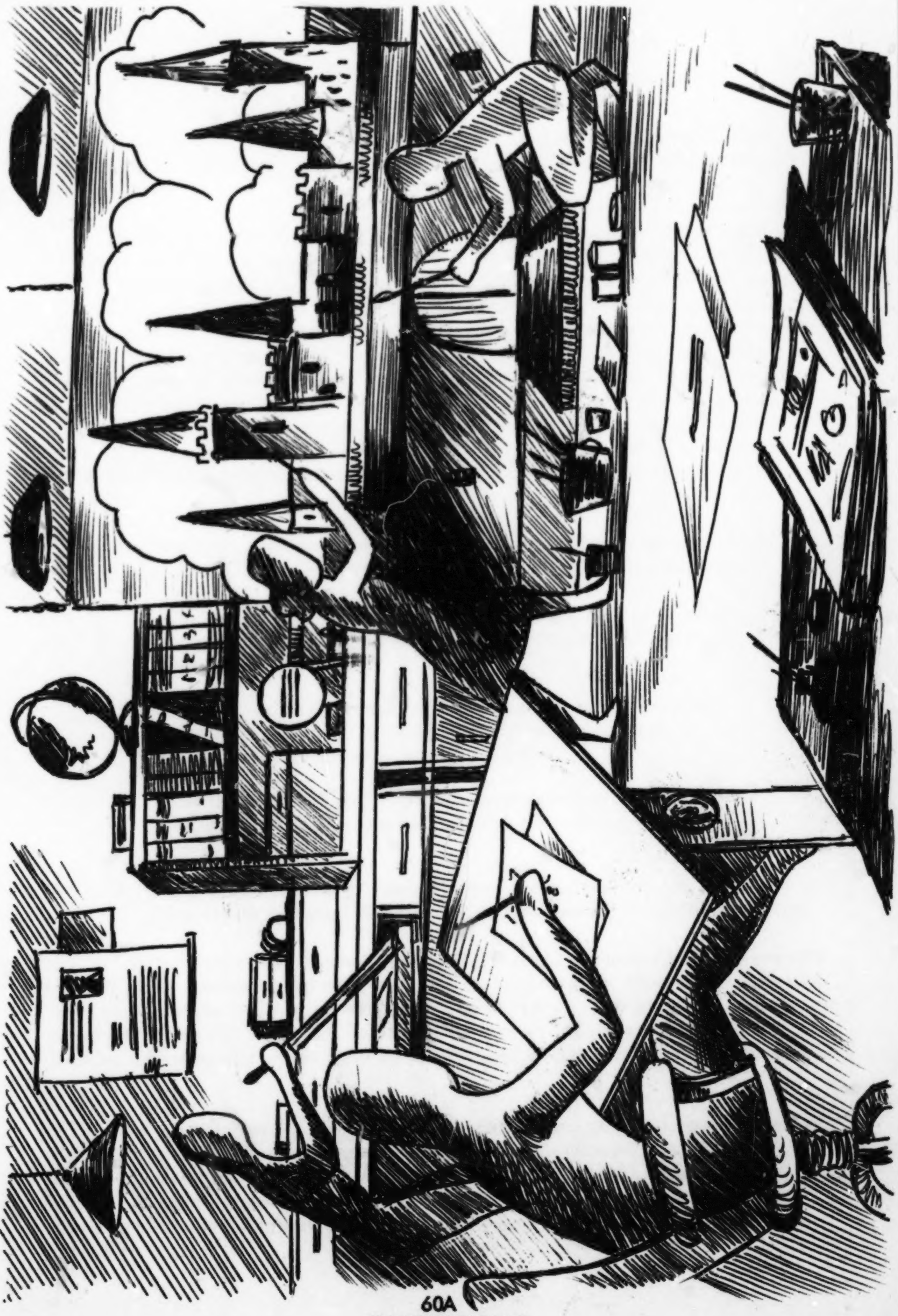


ILLUSTRATION 9

not a replacement, (4) be a constructive critic and not a retiring non-participant, and (5) want to utilize television without resenting its "intrusion" into his previously closed bailiwick.

Imprudent criticism, an ill-timed and poorly chosen word or phrase can cast the shadow of distrust on any instrument used in a classroom. But because television is the vehicle for human beings and their inherent fallibility, the role of user and critic takes on more responsibility. If the classroom teacher's attitude toward the utilization of television is constructive, the feeling spreads to his entire class, and correct psychological conditions for learning are established. But students using television seems to learn in spite of poor classroom conditions; their learning improves in proportion to the constructive utilization of the instrument. Even with the team approach, the classroom teacher with his personal presence is the key to the acceptance of, and learning by, television. He is responsible for creating proper attitudes within his viewing group. If he fails at this task, television is not to be blamed.

Studio presentations seem to offer more advantages than handicaps for the teaching of any lesson. The following four points substantiate this statement:

1. The studio teacher has the advantage of the skills and thinking of many who are concerned with transmitting one thing - good lessons.

2. The studio situation requires that one approach a lesson as a complete and carefully paced unit, not one interrupted by irrelevent questions or other distractions.

3. The studio and its equipment reinforces points in lessons by focusing attention on corroborating visuals without peripheral annoyances.

4. The studio is a sort of Pandora's Box, but the contents are critically conceived and the lid which emits the contents is carefully controlled.

The handicaps that the studio presentation creates are only those involved with physical space, personnel and equipment. In its final analysis, teaching by television seems to offer these challenging questions: Can pedagogic pursuits be bold and resolute enough to utilize this instrument from the driver's seat? Might a study of how people learn be refined to dictate the terms by which more technological advances can be made?

The preceding sections dealing with studio teacher-professors, communication specialists, and graphic artists were prepared in collaboration with Mr. Edward C. Kercheval, studio teacher for the Washington County Closed-circuit Television Project. The views expressed were corroborated by interviews with studio and classroom teachers in Washington County and other areas using television as a medium of instruction.

Conclusions

The compilation of data and an analysis of significant facts produce these opinions.

1. The following steps should be taken to establish an educational television operation.
    - a. The institution must establish a complete systematic and articulate justification of the needs and potential uses of television relative to a well defined and planned program.
    - b. Administrators must acquire support from influential administrators at all levels of the institution in planning, programming and operating of television and seek community support through public information and public relations programs.
    - c. The development of plans for the use of television in the education process must include methods of measuring successes achieved.
    - d. The developmental process of introducing and utilizing television in instruction must follow prescribed procedures. This developmental process should follow an evolutionary procedure for facilities, personnel, techniques and programming.
    - e. A systematic, organized and continuing evaluation of the processes of communication and student learning must be followed.
2. A liaison should be established between a selected body of educators and design engineers to develop equipment to meet specific uses in education.[1]
    - a. Present equipment available offers must flexibility. The use of professional equipment is recommended in any installation. Provision should be included in planning to enable the operation to expand and become more diversified without reducing the flexibility or standards of quality.
        - (1) Diversified operations may include closed-circuit, open-circuit, recording via film and/or tape to originate telecasts for distribution over wide areas. Television equipment standards (as required by licensed television broadcasters) promulgate interchangeability of equipment as well as programs.
        - (2) The installation of standardized equipment and the techniques which have been developed enables new operators to avoid difficulties which have plagued the "pioneers."
    - b. New equipment designs are constantly under study by manufacturers and they are continuously improving equipment in production as

[1] "Automated Teaching," Growth Stock Review, No. 31, July 1960.

well. Equipment standards are very carefully developed to satisfy long term requirements. New models of equipment reflect improvement in signal quality through modifications of amplifiers, tubes and related circuit developments but retain standards established throughout industry. Changes in equipment standards involve the economical status of the entire electronic industry and all users of television equipment. New designs may result in lower costs, equal or greater performance characteristics and more flexibility. New or improved products which will add to present television facilities are these:

(1) Improved and less expensive cameras are being developed. The use of transistors and solid state components are contributing to design changes. More stability, lower power requirements, improved photo-sensitive surfaces and better signal to noise ratio are among the improvements in current camera design models.

(2) Increased service via coaxial cable is forth-coming. With new amplifier design achievements, closed-circuit services can be extended by cascading many amplifiers to extend systems several hundred miles. Reduced costs for closed-circuit (lease or own) installations are predicted. This is a result of technological developments.

(3) Less expensive recording media are needed. Film or videotape techniques currently used are too expensive for many institutions. Thermo-plastics offer at least a competitive medium to present processes. Less expensive videotape recorders are expected to be marketed soon.

(4) Television viewing devices are being improved and modified.

    (a) Large screen projectors with higher brightness and better resolution are under development. Cost factors continue to be high.

    (b) Television receivers or display devices are needed which 1. are adaptable to wall or desk installations, 2. have less reflective front surfaces (sealed protective covers are now being marketed which reduce the air filter effect on picture display tube area) and 3. utilize fewer adjustments to optimize set performance.

(5) Local common carrier agencies are prepared to install closed-circuit facilities in every community. (a) Rates are available to interested applicants. (b) Long term contracts require changes in some existing legislative regulations at local and state levels.

(6) Conservation in television channel specturm is under study and development. The Columbia Broadcasting System Laboratories are testing the feasibility of television channels 1/2 the 6 megacycle width. This would alleviate the present limitations on the number of TV stations in a geographical area.

(7) Development of communication devices adaptable to television (teaching machines)[1] are needed to stimulate greater learning by students.

c. Physical space requirements are almost unanimously agreed to be in the amount of 2500 square feet of floor space (40 feet by 60 feet) for an operative studio with a 15 foot ceiling and approximately 4800 square feet available for subordinate activities. Each additional studio should be as large or larger depending somewhat on the scope of the operation. These dimensions serve well in terms of flexibility. Utilization of a facility is mandatory to justify the expenditure required to equip and staff an on-going operation. Programming should be planned in order to achieve the maximum potential of the facility.

d. Two way communication systems are desired to increase the student interaction in the learning activities. Subject matter specialists could contribute much in planning television teaching laboratories. A device perhaps much unlike present concepts of two way communication would improve the use of television. Authorities feel that the present concept of two way communications reduces the effectiveness of the television presentation. This is an area that needs to be studied. An example of a technique applicable to television known as "TELETEST COMMUNICATIONS"[2] is under study by Dr. Richard Lewis, San Jose State College, San Jose, California.

e. Staff requirements include a variety of talented people.

(1) Engineering personnel must be proficient and capable. Previous experience and technical training are highly

---

[1] Gene Bylinsky, "Robot Teachers," Wall Street Journal, pp 1 and 19, August 8, 1960.

[2] Robert E. Corrigan, et.al. "Teletest Communications," April 15, 1960.

recommended for as many of the technical staff as the operation warrants; the administrative or supervising engineer should be professional.

(2) Studio teachers should have experience in regular classroom teaching, a flare for showmanship, a good academic background in the area assigned (subject matter) and experience in the communication arts.

(3) Resource people and information as to what resources are available are essential. A better understanding of how these will improve student learning is also needed.

(4) Production people or communicators who serve as translators to assist in transforming the efforts of teachers into effective learning situations for the students are in high demand.

(5) Staging and lighting specialists are valuable to assist in developing the artistic atmosphere within the studio stage area.

(6) Artists are needed to assist teachers in developing supplementary (visual) materials as needed in lesson presentation. Skill must be exercised in the proper selection as well as artistic development of these materials. All too frequently the importance of the productivity of an art department is underestimated.

(7) Semi-skilled personnel render much assistance in the studio as cameramen, assistants to the teacher in presenting material, directing activities within the studio and other menial tasks. In a two camera studio operation, three such people should be used; one for each camera, and one as a floor director.

(8) People with multiple skills are often employed to fulfill multiple requirements. Experience and training of a few key people assist in developing inexperienced personnel, provided the operation requirements expand through evolutionary stages.

f. Finances for educational television continue to be the greatest single problem for institutions to resolve. Three suggestions are offered to alleviate the situation. (1) Television should be included as an instructional expense as is other services (such as telephones, postage, libraries, science demonstration equipment, etc.). (2) The use of television should be included in the accounting expense procedures to show that it is an economically justified service operation. (3) Boards of Education, Commissioners, Boards of Trustees and other governing bodies must better understand the advantages educational television renders to an institution. The time has come when educators should be able to justify the use of television in instructional programs. Where there is doubt as to whether television is a justifiable expense then this should become the first area of study in the institution using the medium through a cost analysis evaluation of services rendered.

g. Evaluation and utilization of the medium in instructional areas carries the burden of proving the economic feasibility of television. Most reports indicate instruction effectiveness or learning by students through televised presentations equals or exceeds regular classroom techniques. Financial restitution depends on program application. This is based on the probability that telecasts are invariably presented by master teachers or by teachers with certain advantages generally not shared by classroom teachers and the advantages are shared by large numbers of students. Areas which need to be studied in terms of evaluation are, (1) the impact index of the televised lesson on the student; that is, maximum use of television as a communication medium, (2) how students learn; particularly how to measure what has been learned by the student and (3) the method of applying television to achieve maximum learning by the student. In these concepts it is difficult to separate evaluation and utilization since one is dependent upon the other.

A study of utilization of facilities indicates that most institutions are not actually operating more than a small portion of available hours. This would indicate that the marginal operation would become financially justifiable if the facility were extended to its potential. Instructional values of telecasts are likely to increase considerably as the techniques and efficient use of the medium are better understood.

h. A lease-purchase of equipment provides some advantages. Present practices, by most major manufacturers, are to offer a lease agreement over a short term such as three or five years. The yearly lease price is an amount equal to the purchase divided by the number of years of the agreement plus approximately 5% of the total purchase price. Ownership is acquired at the end of the term. Service contracts can be negotiated additionally which relieve the contractor of maintenance problems. A lease (without purchase) offers these advantages; (1) no capital investment (2) replacement and servicing costs are borne by the lessor, (3) some liabilities are avoided, (4) obsolescence risks are eliminated, (5) no amortization costs, (6) ownership of properties or right away privileges can be avoided and (7) personnel, special test and maintenance equipment costs are supplied in the lease contract.

3. Television, as it is used in education today, is a process of adopting a product for a function which was designed for another purpose. In some cases the purposes for which television is used is very satisfactory. In others, less effective results are achieved. New types of equipment need to be developed which will supplement the present procedures in measuring student reactions and responses. The planning and design of new equipment is a procedure which should be carefully studied through research coordinated by educators and design people to develop or modify existing equipment to better fit the communication problems. Methods of teaching need to be further studied to determine general concepts which would make the design of new equipment most useful. Most educators agree that the results which can be achieved with present professional equipment and staff does accomplish much of what is desired in the way of utilization of the medium in effective teaching-learning processes. (Emphasis is again placed on the selection of professional equipment and staff).

4. Projected plans of institutions cover the following activities in television.

   a. A continuation of the study of student learning methods and habits, environmental problems associated with viewing rooms and an evaluation of technological developments (large screen projectors, new camera designs such as the 4 1/2 inch image orthicon, new receiver picture tube designs, teaching machines, presentation methods in the studio, recording media, art and graphic techniques for camera use etc.).
   b. Widespread use of cable distribution systems and networks on intra-campus bases.
   c. The use of programs on an inter-institution basis, distributed via videotape, film recordings, microwave, rebroadcast and translator methods.
   d. Integration of open and closed-circuit operations to maximize service communities.
   e. Use of "drop-in" open-circuit services (low power and restrictive use) of additional VHF stations to achieve more facilities.
   f. Cooperative ventures with commercial licensees to reach larger audiences.
   g. Development of UHF allocations to increase service to communities.

5. Area distribution of television programs take on a form of multiple services through combinations of closed-circuit and open-circuit

systems, with facilities to extend services through microwave, translator or re-broadcast methods. Oregon, California, Oklahoma, New Mexico, Florida, North Carolina, Alabama, South Carolina, Maine, Ohio, Utah, Wisconsin, and Texas are operating or planning to operate area facilities whereby telecasts originate at one of a number of locations and are to be distributed over most of the respective states. Three regional areas are contemplating or are planning significant services. (1) Airborne Television will be inaugurated over Indiana, Ohio, Michigan, Wisconsin, Illinois and Kentucky. Present plans indicate programming will commence in early 1961. (2) A six state area is studying the feasibility of installing a microwave relay system to provide Minnesota, South Dakota, North Dakota, Iowa, Wisconsin and Nebraska with an interchange of programs. This service may not cover the major part of the respective states with television service. (3) The Southern Regional Broadcasting Association has a plan under study which would enable Southern states to share program services. The interchange of recorded programs (via film and/or tape) provides a method for all institutions to share instructional materials.

6. Environmental conditions of viewing areas provide an area for much study.

   a. Control of outside (window) and inside light should be further investigated to achieve better diffusion to reduce glare and reflections. For television viewing, indirect lighting or *equivalent is recommended.*

   b. Acoustics of viewing rooms are poor in most areas from the standpoint of reverberation and transmission through building members. Treatment of all sides of the room; that is, ceiling, walls, and floor need to be investigated to reduce noise distractions from classroom activities.

   c. Ventilation of all classrooms with adequate air interchange must be included to provide the desired relative comfort for occupants during all seasonal weather extremes.

   d. A study of the optimum television receiver for viewing areas should include these.

      (1) The best location of receivers in classrooms.

      (2) The most suitable height of receivers for comfortable (effective) viewing for various age groups.

      (3) Types of mounting for receivers need to be developed to allow sets to be supported by brackets or floor stands.

      (4) A study to determine the most desirable physical shape and types of receiver enclosure to achieve the maximum flexibility for various types of installations (picture tube separate from other electronics etc.).

(5) A development of specifications for television receivers (sound reproduction, size of screen, relative picture brightness, color or black and white, resolution capabilities etc.).

(6) An investigation of the relative effectiveness of various picture qualities in terms of the technical requirements of the television picture.

(7) The practicality of building receivers with "unitized" chassis (removeable, interchangeable units) construction to minimize service and maintenance problems.

(8) A study to determine the optimum length of viewing spans, frequency of viewing periods and class sizes for respective age groups.

7. The problems of scheduling courses via television for many school systems should be solved by mutual agreement in conferences by school administrators. Recording media (videotape and/or film) plus the use of multiple channels suggest various solutions. The integration of open and closed-circuit facilities minimize conflicts. Other methods of solving these problems may come about through reduction of variables by administrators, adjustment in class period lengths, a restudy of optimum length of class period lengths and a study of the maximum learning probabilities by students in other than traditional practices. Combining grade levels in special subject areas offers further relief; chemistry for juniors and seniors in a combined class, for example.

8A. Classroom teachers who have experienced telecasts regularly for instructional purposes have mixed feelings concerning the medium. Most express a tolerant attitude and some favor conventional forms of instruction. A minority express opposition which stems from a group of causes which are summarized as follows.

a. A hankering for traditonal rather than new methods of teaching is held by some.

b. A negative reaction to the use of television due to poor service, presentations and methods of teaching (via the studio teacher) is often indicated.

c. Classroom environmental problems (poor acoustics, light interferences from windows, fixtures, etc.) are detrimental to good TV utilization.

d. Lack of communication through administrative levels to enable the planning of classroom activities appropriately with telecasts is a problem.

e. Inability of the classroom teacher to capitalize on the instructional value of telecasts due to inadequate planning is obvious.

8B. Recommendations of classroom teachers for the continued use of television are these.

a. Elementary telecasts, because of attention span, should not exceed 20 minutes.

b. Sequential subjects such as mathematics should allow much time for follow up. The telecast of the lesson should be offered on alternate days allowing sufficient classroom teaching.

c. Studio teachers should make greater use of video tape for evaluation and improvement (mannerisms).

d. Adult education and teacher education programs (such as the Institute of Maryland Public Affairs) should be offered.

e. Administrative announcements made over TV facilities are valuable in improving efficiency in institutional administration.

f. More films should be shown for general viewing during psychologically low periods (during inclement weather etc.).

g. Spare television receivers are useful to reduce loss of telecasts due to set failures.

h. Science should extend through grades 1 to 12.

i. High school offerings by television could be enlarged to permit larger viewing groups and a redistribution of teacher time and load.

j. It is important to use experienced production personnel for best results.

k. Length of televised lesson should be more standard within each course of study to assist the introduction and follow up (discussion) sessions.

l. Students should be given an orientation on the following:

   (1) How to best use televised instruction.

   (2) Methods of developing the best study habits.

   (3) The differences between usual instruction and learning compared to instruction by television.

   (4) How to establish methods for the most learning.

m. Adult (post graduate and under graduate) courses should be offered to enable students who have developed learning habits from the use of television to continue learning from educational television resources (ETV programs).

8C. Student reaction to television is influenced much by the rapport between studio and classroom teachers. Student reaction varies also at different age levels. Much enthusiasm is found in elementary grade levels, less enthusiasm at the junior high level, indifferent and generally passive attitudes at high school and college levels. These later two groups favor conventional forms of instruction but are not opposed to television.

8D. Television studio teachers have had to search for many of the supporting elements of teaching methods which could not be carried over from classroom teaching. Colleges should staff their faculty with professionally experienced people in television arts and include various aspects of training in this field as a part of the teacher education program. It is true many procedures and techniques commonly used in commercial television are applied effectively in educational television. Education in the communication arts should include these.

a. Basic principles and applications of camera techniques.

b. The purposes of the team approach.

c. How to utilize television in the learning processes; the role of the studio teacher and the classroom teacher.

d. The use of film, slides and the many resources available through the use of television.

e. Methods of acquiring sequential responses from students during the telecast.

f. Processes of improving television production techniques.

8E. Reports indicate that there are no certain subjects or materials that are especially adaptable to television. Rather it is firmly believed much more is to be done toward developing methods of teaching which will make better use of the medium in all subject areas.

8F. Favorable reactions to the use of television from experienced teachers include the following comments.

a. It is an integral part of instruction and must stay.

b. Lessons are not simply enrichment, but direct instruction.

c. The greatest service it renders is the upgrading of teachers.

d. It offers total instruction in areas where teachers are very weak or hold emergency certificates.

e. Television requires both studio and classroom teachers to work harder in some instances, but it is good.

f. It affords no place for the lazy, complacent studio or classroom teacher.

g. It is a preferred method for presenting films.

h. It is a justifiable expense, in the catagory with the textbook.

9. Film and tape recordings serve significant purposes in educational television. Agreements both general and specific, should be developed on royalties and copyrights before programs are produced. Delayed return or income should be shared by "talent," producing organization and distributor. Uses of recordings may be summarized as follows.

a. Better management of program scheduling is afforded through the recorded media.

b. A method of delaying and/or repeating presentations is enhanced by means of recordings.

c. Recordings provide a means of storing telecasts for permanent records.

d. Tape and film extend the uses and provide broad distribution of materials.

e. Recordings permit accurate development of programs involving variable resources, timely topics, difficult demonstrations and other problematical elements through editing, control of cost and time factors, availability of personnel and other considerations.

f. Recorded materials provide an opportunity for content and analysis study.

10. The problem of whether to offer supplementary and/or direct instruction via television should be resolved in terms of the following.

   a. Through study determine what and how to supplement.

   b. Diagnose critical points or levels of difficult subject material areas that need emphasis.

   c. Integrate supplementary and direct instruction materials.

   d. Promote respect and prestige for supplementary and direct instruction through careful selection of areas and materials used.

   e. Build and maintain a strong favorable image of television and classroom teachers.

   f. Reduce distractions and interference factors from all teaching.

   g. Develop high esteem and prestige among the teaching team.

   h. Establish rapport between studio and classroom teachers; as well as between teachers and students.

   i. Pursue and achieve competencies in integrity and humility.

11. Television as a method of instruction is justifiable.

   a. TV can be used to reach a great number of students with materials and information not otherwise available to them.

   b. Superior instructors can be employed to provide improved instruction over wider areas than normal teaching.

   c. Greater utilization of the various communication arts can be achieved through the medium.

12. Work load of television personnel should be periodically reviewed.

   a. Each person should have his work well defined.

   b. Area and specific responsibilities should be assigned.

   c. Time should be allocated for professional employees to spend some of their efforts in creative interests.

d. There should be a differentiation between non-professional and professional personnel.

e. Allowances for individual variables should be recognized.

f. Rewards for exceptional and outstanding work should be provided.

13. Television can be used to produce either positive or negative results and does much beyond regular classroom instruction. Television offers the following attributes.

a. The classroom is extended as a viewing window to the outside world.

b. Resources of the community and the world, not normally within reach of the classroom, become a part of the program.

c. It extends the efforts of instructors (via open-circuit) to every viewing area in the community.

14. Methods of acquiring and retaining a viewers interest in a telecast is an art in itself. Much research and study would contribute needed information to this area. The Wisconsin Television Laboratory Study #9 reports on factors investigated and supplies interesting data. A continuation of such a study would be desirable. A project in Oregon relates aspects in this area of interest also. Suggestions for developing interest among viewers might include these ideas.

a. Inform the audience of the program schedule.

b. Involve faculty and departmental heads in areas of evident need of service.

c. Select course materials skillfully to achieve particular objectives.

d. Incorporate community leaders and community interests in planning and programming.

e. Use promotional activities and methods.

f. Make certain compromises are minimized in every effort to maximize program excellence.

15. The Table of organization of an educational television operation assumes many forms. Usually, broadcast operations pattern the organization along the lines of commercial TV stations. Local interests and programming plans offer some assistance toward the most advantageous method of organization. Competencies of people available or procurable also suggest and dictate methods of procedure. If the operation is to be integrated closely with teaching and learning, it should be organized to involve as many associated departments as possible to take advantage of the total resources of the institution.

16. Colleges and universities should assist or accept more responsibility in determining what kind of people are needed in television.
    - a. A great number of people are needed in research.
    - b. More experience and methods should be offered in the use of the communication arts.
    - c. Education in and experience for people interested in television operations is recommended.
    - d. Recruitment programs should be established to interest people in television.
    - e. Definition of areas for experience and performance criteria should be established.

17. Common problems of educational television operations are summarized as follows.
    - a. Technical facilities, though quite adequate, need improvements.
        - (1) Studio space and associated areas are too limited.
        - (2) More TV channels for station operations are needed.
        - (3) Better controlled and improved environmental conditions in viewing room areas are recommended.
        - (4) Problems in achieving and maintaining optimum performance from technical facilities must be overcome.
            - (a) More and better test equipment is needed.
            - (b) More stand-by or auxiliary equipment should be made available through budget appropriation.
            - (c) More technicians are needed on staffs to provide better service through preventative maintenance.
            - (d) Dissemination of technical operative and planning information among operations would assist toward improving engineering.
    - b. Staff personnel are needed in all areas. Abilities need to be commensurate with responsibilities assigned to performance requirements. Personnel needed for present and new operations include the following.
        - (1) Learning Resources and Methods Director.
        - (2) Teachers-Professors.
        - (3) Communication Specialists.
        - (4) Artists (graphics, staging, lighting, photography).
        - (5) Engineers (technicians).
        - (6) Director-Producers.
        - (7) Script Writers.
        - (8) Cameramen.
        - (9) Floor Directors.
        - (10) Un-skilled or Semi-skilled Assistant.

c. Financial problems plague most television operations. Obviously, sufficient budgets would resolve most problems. Television must be shown to pay its way with "plus" gains. Grants and gifts assist as initiating measure but cannot be assumed to continue and should be regarded as temporary aid. Television, like a business, must be able to render a service equal to or greater than its cost. Often underestimated operational costs result in (financial) hardships which are extremely difficult to overcome. Cost accounting procedures must be applied to accurately determine economic feasibility of television. It should be included in budget preparation as an instructional cost the same as other services (teachers, books, telephones, buildings, building equipment, etc.).

d. Evaluation of instructional television must be appropriately integrated with other research, tests and measurements to accomplish the purposes of education in our society.

18. Television is a general medium with broad capacities of serving functions of radio, photography, film (motion and still) and many realms of organized information. As stated by Dr. C. R. Carpenter, Professor of Psychology, Pennsylvania State University, "Television is a blank channel. It is the organized information relevant to learning needs of students which gives its substance. It has potentials, when used properly, of improving probabilities of student learning."

19. Educational television is recognized as a new dimension in the learning process. Pioneering efforts must continue from the established foundation of facts compiled to date. Effective use of the medium must be deliberated and studied to achieve progress. The technical facility, personnel and dynamic use of the medium are inseparable components in the successful use of television. Areas subject to further study are these.

a. How can television be used advantageously at all levels of learning, transitional periods (from high school to college, college to professions, normal to national emergency situations and vice versa), public service and information telecasting, and in general to perpetuate the elements of our heritage?

b. What equipment is necessary to achieve the highest efficiency in disseminating knowledge from all learning resources?

c. What is a systematic and accurate procedure to measure results of learning experiences?

d. How can nationwide perspectives, policies and plans be developed to coordinate efforts and research activities?

20. Terminology has created many problems in educational television. Some terms which have been borrowed from commercial television are not always acceptable among educators while others which have been substituted are often in poor taste. These barriers should be removed through a redefinition of the many terms which have come with the new art of television.

BIBLIOGRAPHY

"Automated Teaching," Growth Stock Review, No. 31, July 1960.

Bylinsky, Gene, "Robot Teachers," Wall Street Journal, pp 1 and 19, August 8, 1960.

Chapman, Dave, et.al., Design for ETV, Chicago, R. R. Donnelley & Sons, 1960.

Chinn, Howard A., Television Broadcasting, New York, McGraw Hill Book Co., Inc., 1953.

Check List for Planning Educational Television Stations, Washington, Joing Council on Educational TV, March 1959.

Corrigan, Robert E., et.al., "Teletest Communications," April 15, 1960.

Cruisenberry, W. O., and Greenhill, L. P., "A New Moderately Priced Television Film Recorder," Journal of the Society of Motion Picture and Television Engineers, Volume 68 No. 7, July 1959.

"Current Lighting Practice for Color Television," Illuminating Engineering, New York, Illuminating Engineering Society, December 1955.

"Current Lighting Practice for Television," Illuminating Engineering, New York, Illuminating Engineering Society, September 1951.

Feasibility and Role of State and Regional Networks in Educational Broadcasting, The, Proceeding prepared and published by the National Association of Educational Broadcasters pursuant to a contract with the Office of Education, United States Department of Health, Education & Welfare, 1959.

"General Lighting Information," General Electric Intra-Tel Closed-Circuit Television, pp. A300.1, A300.2, April 15, 1958.

Kinescope Technical Requirements, National Educational Television and Radio Center, Ann Arbor, Michigan, 1960.

Lewis, Philip, Educational Television Guidebook, New York, McGraw Hill Book Company, Inc., 1961.

Lighting Lingo, Society of Motion Picture & Television Engineers, New York.

Proposed Guidelines for Teacher Education Institutions in the Use of Television, ("California State Department of Education Pamphlet"), Bureau of Audio-Visual Education, November 1957.

Television Studio Technical Requirements, National Educational Television and Radio Center, Ann Arbor, Michigan.

Videotape Technical Requirements, National Educational Television and Radio Center, Ann Arbor, Michigan, 1959.

Walker, A. Prose, NAB Engineering Handbook, New York, McGraw Hill Book Co., Inc., Fifth Edition, 1960.

Williams, Rollo Gillespie, "New Variable Color Luminous Studio Wall," Journal of the SMPTE, pp 401-403, July 1957.

Appendix A

Hagerstown Television Conference

Appendix B

Kinescope Technical Requirements
Television Studio Technical Requirements
Videotape Technical Requirements

Appendix C

Results of Survey

Appendix D

Manufacturers of Television Equipment

Appendix E

Confidential Critique

HAGERSTOWN TELEVISION CONFERENCE

May 25, 26, 1960

HAGERSTOWN, MARYLAND

THE PURPOSE OF THE CONFERENCE

The purpose of this conference is to draw upon the professional knowledge, experience and travels of all participants in order to assist in completing a study being conducted by the Washington County Board of Education, Hagerstown, Maryland, for the United States of America, Department of Health, Education and Welfare, Office of Education, Washington 25, D. C., O.E. Contract #SAE 8347, Contract for Dissemination Activities Pursuant to Public Law 85-864.

TITLE OF CONTRACT

A Survey of Television Equipment and Facilities Used for Purposes of Instruction by Public Schools, Colleges and Universities.

Dr. William M. Brish, Superintendent of Washington County Schools
Mr. John R. Brugger, Director of Project

ACKNOWLEDGEMENT

This study reported herein was performed pursuant to a contract with the United States Office of Education, Department of Health, Education and Welfare.

The Government reserves the right to duplicate, use and disclose in any manner and for any purpose whatsoever, and have others so to do, all Subject Data.

TABLE OF CONTENTS

I. General Information

- Statement of Purpose of Conference

(4 & 5) - Participants

II. Items for Discussion

(7)* - Where are we in ETV ? Where are we going? Where should we be now?
84, 85

A. Facilities
B. Application
7, 27, 84, 85

(9)* - What equipment is needed to do the job?
12, 13, 14, 19, 22, 23, 24, 25, 26, 27, 29, 30, 31, 32, 33, 36, 38, 60, 61, 62, 63, 101, 102, 103, 110, 114

A. What of present equipment
39, 41, 44, 50

B. What of future equipment
40, 43, 46, 47, 48, 50, 89, 103, 104, 105, 111, 113

C. What of physical space
37, 53, 54, 55, 56, 57, 58, 59, 97, 100, 101

D. What of environmental conditions
96, 97

E. What of two-way communication
44, 45

F. What of staff requirements
25, 28, 30, 35, 36, 37, 64, 65, 66, 80, 98, 99, 100, 113, 115

G. What of finances
42, 51, 52, 93, 109, 110

H. What of evaluation
21, 23, 24, 30, 33, 45, 58, 59, 64, 66

I. What of leasing equipment
45, 108, 109, 110

(11)* - How are educational institutions thriving on grantless programs?
14, 51

(13)* - How do we implement an operation or program? That is, how do we get into business?
14, 28, 29, 32, 33, 38, 40, 41, 92, 93

TABLE OF CONTENTS - Continued

(15)* - How is the audience captured and held?
18, 19, 90, 91, 92, 93, 94, 95, 96

(17)* - What can TV do beyond the classroom? What can it do beyond films, radio, etc? Is it a "tool" or an instrument?
13, 14, 20, 45, 52, 54, 76, 77, 97

(19)* - How would you design a Table of Organization for an educational institution's TV staff? To what institutional department would it be attached? How would you solve operational costs? Are we an educational institution or a service organization?
50, 51, 106, 107, 108

(21)* - What could and should colleges and universities do to train personnel needed in various capacities to work with ETV?
34, 62, 67, 79, 80, 81, 82, 83

(23)* - What is or should be the work load of TV personnel?
70, 71, 72, 77, 78, 79

(25)* - What are the purposes of film and tape in ETV, and how can they be used? What are the implications with respect to royalties and copyrights?
22, 47, 76, 77, 78, 79, 86, 87, 88

(27)* - When a large area involving many school systems is served, how can the problems of scheduling, courses, and timing be solved by or for administrators?
13, 14, 46, 47, 72, 100

(29)* - Is the current use of TV facilities in line with the manufactured product design?
18, 40, 41, 45, 46, 72, 73, 74, 84, 85

(31)* - What concern should be given environmental conditions of the viewing areas?
53, 101, 102, 104, 105

(33)* - Recap classroom teacher reaction, student reaction, and studio teacher reaction with respect to training needed and subjects adaptable to TV.
46, 75, 98, 99

TABLE OF CONTENTS - Continued

(35)* - Comment on the following statement: Television lives on all the other arts, it consumes enormous quantities of material, is critical in its treatment of material. Is it neutral?
76, 80, 81, 82

(37)* - What are some problems concerned with supplementary vs. direct instruction?
8, 15, 16, 17, 20

(39)* - What makes TV instruction worthwhile? How do you test or evaluate? Can conventional methods of testing apply?
10, 11, 12, 17, 35, 74, 83

(41)* - Recapitulate networks of

A. Area
B. State 49, 77
C. Regional 72, 77
D. National 73, 74, 75

(43)* - What are some projected plans?
13, 45, 75, 99, 101

(45)* - What are some common problems concerned with

A. Technical facilities?
13, 36, 37, 38, 39, 41, 42, 43, 44, 46, 47, 48, 54, 55, 85, 88, 89, 97, 98, 99, 100, 101, 110, 111 112, 113, 114, 115
B. Staff?
35, 36, 46, 66, 68, 69, 70, 79, 80, 81, 82, 83, 115, 116, 117, 118
C. Finances?
42, 50, 51, 52, 93, 109, 119
D. Evaluation?
20, 37, 40, 44, 74, 75, 82, 83

(47)* - Nomenclature
9, 36, 64, 65, 66, 67, 69, 81, 82, 83, 97

*When a page number if referred to in the text, refer to the topic number indicated in brackets.

- PARTICIPANTS -

#0 Mr. John R. Brugger
Chief Engineer
Hagerstown TV Project
Hagerstown, Maryland

#1 Mr. Patrick J. Callihan
Station Relations Associate
NETRC
New York, New York

#2 Dr. C. R. Carpenter, Professor of Psychology
Pennsylvania State University
University Park, Pennsylvania

#3 Dr. F. Claude Hempen, Director
KNME-TV, 1801 Roma Avenue
Albuquerque, New Mexico

#4 Mr. Kenneth Jones, Program Director
San Diego State College
5402 College Avenue
San Diego, California

#5 Mr. Jack McBride, Director of Television
KUON-TV
12th & R Sts.
Lincoln, Nebraska

#6 Mr. Carl Menzer, Director
KSUI-WSUI
University of Iowa
Iowa City, Iowa

#7 Mr. Fred Remley, Chief Engineer
University of Michigan Television Center
310 Maynard Street
Ann Arbor, Michigan

#8 Dr. R. L. Rider, Director
Chelsea Closed Circuit Television Project
437 West 27th Street
New York 1, New York

#9 Mr. Robert F. Schenkkan, Director
University of Texas Television
Austin, Texas

- PARTICIPANTS - Cont'd.

# 10	Dr. Warren F. Seibert U. S. Office of Education Washington, D. C.
# 11	Dr. H. J. Skornia, President National Association of Educational Broadcasters 14 Gregory Hall Urbana, Illinois
# 12	Mr. Gerald J. Willsea, Program Director KRMA-TV 13th & Glenarm Street Denver, Colorado
# 13	Dr. William M. Brish Superintendent, Washington County Schools Hagerstown, Maryland
# 14	Mr. Edward C. Kercheval Hagerstown, Maryland
V	Voice(s) (Used when it was impossible to identify the speaker from the tape, or a situation where several were speaking at the same time. An attempt was made to capture the group feeling or general reaction in such instances.)

CODING EXPLANATION

The first digit(s) identifies the speaker who is listed and numbered as a participant on this and the preceding page. The second digit(s) identifies the paragraph number. Paragraphs are numbered consecutively.

Forward

Education is the process of influencing the minds of men. The role television is attaining in this process is at an ever increasing scope in quantity and quality. Conformity, rather than diversity, represents the greatest element of success of television in educational functions.

The development of suitable recommendations, status evaluations and new design considerations were enhanced considerably, and other vital information was collected through a conference which was held May 25 and 26, 1960. The participants listed on preceding pages were invited to Hagerstown to discuss the issues and topics which are of major concern in this survey. These participants represent varied interests, prejudices and experiences in the field of operations under study. Their resources, knowledge, positions of leadership and organizational activities provided a core of information which corroborated and enlarged upon other findings from throughout the country.

The following text was transcribed from a tape recording of the conference.

Text

0 - 1 Some of you fellows have been here an hour or so. This is kind of a late welcome, but, nevertheless, I am glad to have you here. I feel the privilege is ours to have the opportunity to work with you on this project, namely, the contract we have with the U.S. Office of Education. There are many questions and many answers which we should consider today. I trust these will help to declare the course of Educational Television. I have put together a notebook which you are to use for a reference; this is to keep us to some rather formal agenda; yet it is not meant to be the exact topics for discussion. I merely chose them as points of departure. These, I think, are of real interest to us, as well as things that are not implied in the statements, suggestions, and/or questions. I would like you to bring up things that come to your mind as we go along; we will give them a quick look and some discussion. Before we get into the real action, since a few have not arrived, and in order to start on time, I shall take this opportunity to introduce Dr. Brish, our Superintendent. Dr. Brish, would you give a few words of welcome?

13 - 2 I don't want to do anything except to add to any welcome which John has already given. It is certainly a pleasure to have you here. John has been working very hard in compiling a report for the U. S. Office of Education. All of us feel that this report can be greatly strengthened and mean much more if a group such as this group here today can come together to discuss the problems that are involved, and I think John has high hopes for the quality of the discussion that comes from a meeting of minds here today. The aspects of the program concern themselves with the many technical areas; this is a little beyond my being able to contribute a great deal. Even here I believe we are finding that the big uses and problems etc. of the introduction of television into schools, as an adjunct to the

instructional program, means that the useage, the problems and discussions, are more concerned with education than they are with the technical aspects of the program. Our big problems of success, of using the medium, are educational problems. That does not means that the other things do not need to be placed in the setting where they can contribute to the educational aspects of the program. I think that it is quite pertinent that we work on these topics and I hope that during the course of your discussion, maybe I will have a chance to chip in and become a part of it. Thank you.

0 - 3 I think the note we want to keep in mind is the fact that we are talking about a communication process, a technical facility, and the service it should render to education. As I stated in the letter I sent to you, the purpose of the report requires a study including technical equipment and facilities. The more I look at the problem at hand, the more I think of its very wide scope. It involves every physical attribute of the process - the technical facility, the studio, the personnel, and the way these people work together. The net result of the educational process is, in a sense, the welding together of all of these elements. So, what I hope we can do here, is to talk about the physcial facilities, their uses, what's wrong with them, what they can do, what they can't do. Maybe it's a matter of a line of new equipment we are needing to help to make these all more useful, more helpful. So, let's start with a real problem of the kind on Page 7. I thought that in order to try to establish the frame of mind which I would like for you to have, we should start off with what I might call a "real ringer." Where are we in educational television, where are we going, and where should we be now? I think we have two areas to be considered; (l) the facility; the physical plant, the equipment as it were, the nuts and bolts, the lights, the cameras, the film, everything you can think of in the receiving as well as transmitting part of the operation, and then the other part of the problem is, (2) how well do we use this facility - the utilization? I don't think we should answer these right now, but let me pose the questions. During the course of the afternoon, maybe after dinner, we shall try to determine the answer. In order to help all of you to arrive at a similar answer, let's say that we think in terms of 0 to 5. Let's think in terms of 0 being no television, and 5 being perhaps the place we think television could be. We could conceive that television might be perfect, the application perfect, the facility perfect, this would be score 5. (l) Where are we? l, 2, 3, 4, etc. as to the technical facilities? Then the other aspect, (2) How well are we utilizing this medium? Let's see if, later on, we can come up with some agreement which will represent where we think we might be in the 0 to 5 reference.

8 - 4 May I precede that with a question, John?

0 - 5 Yes.

8 - 6 I am not fishing for the age old problem of a definition for education, but as a frame of reference perhaps it would be useful if we first establish some

kind of framework for what we are talking about here. Are we concerned exclusively with the use of television as related to formal curricular offerings by an organized educational organization? Or are we thinking, as well, in terms of the broader use, loosely described as adult education or continuing education or whatever the term might be?

9 - 7 Further, are we thinking in terms of only the closed-circuit, or closed-circuit and broadcast ?

4 - 8 Might we actually arrive at some terms here? Might we use something like ETV as meaning the total use, ITV, shall we say, referring to instructional, credit only, or community, meaning credit in the greater concept?

0 - 9 Before we do any more commenting here, I would like you to use your booklets for notes, either for things you want to bring up later or for things we don't disucss now, or just plain "doodle sheets." I would like to collect these after the meeting and later mail them to you (if you wish). I would like you, as you sit, to dream and if you hear something which might ring a bell with you, make a note of it. Later we can check these and see if anyone has put down something of significance which might bring some new topics for duscussion. I think we might determine the comparative values, I think we should use ETV and ITV to designate these two areas.

4 - 10 I think Dick had a question concerning that.

8 - 11 Well, without getting into an oration at this time, the question is this - I sense a rather desperate push in many circles toward the use of television for formal curricular situations growing out, I am sure, of the loosely described crisis in education (which certainly is a crisis of all time). I can't help but feel, also, that in our society today, the world in which we live, this broader aspect of adult education, or of continuing general education beyond schooling (no matter where you cut off the school line) is a crucial function if our society is to survive. Everybody begs the issue. It is not the job of the Federal Government, it is not the job of the State Government, it is not the job of school systems, it is not the job of this guy or that guy. I say it has to be somebody's job in this society if we are going to maintain any kind of responsible position in the world. I hate to use these divisive terms which try to separate this whole package. I mean, here is an instrument that can educate at various levels in all kinds of different circumstances. I hate this division which indicates that - well, let's latch onto ITV.

12 - 12 Except for one thing, Dick. I agree with you that the division is unfortunate, but in having a division you do not allow someone then to use educational television, if we can define it as a total scope. This thing you are getting at, to use it, meaning only the instructional portion. I know we run across that where I am located and in my state. We found it very necessary to make some kind of definition here, so that we can't let

someone use a bigger term for the smaller term to thus cut out the other part of it, and we then have arrived at the ITV plus community equalling ETV. Now, I'm not trying to force these definitions onto you, please.

8 - 13 I agree with you 100%.

12 - 14 I see your point. I just simply find the need for it.

2 - 15 Is this autonomy made necessary for legal purposes, or public relations purposes or for purposes of defining professional responsibilities?

4 - 16 Well now, I think in our case that we have a legal-political problem here that would make it necessary for those in the state that are interested in community television and for those within state education primarily, who are in government, who are interested in television as a teaching tool or instrument, (however you wish to define that) to make it possible for each side to see the other part that is involved in the total educational television concept. Have I answered your question or have I begged it?

2 - 17 Well, you see I - - - plus voices!

4 - 18 I begged it !

2 - 19 Well, you see I hate these categories and I think as we begin to think freely, we find them restrictive, and I would propose once more that we take a very broad prospective of this facility and then see where it fits into the needs for education and what educational functions, various kinds of equipment can serve or should serve.

4 - 20 Then I will answer your question by saying yes, with expediency in mind.

0 - 21 I would like to leave this definition catagory in two components here - ETV and ITV. ETV will be the cradle to the grave concept; ITV will be the Hagerstown type operation, direct instruction, limited areas serving, specifically, class instruction. Is that satisfactory; is that the type of thing we are trying to put down here?

12 - 22 Well, I agree with Dr. Carpenter, if I understood him as saying that, as a group, we should take a broader point of view here. Is that right?

0 - 23 Merely for satisfying just this one problem. We have a number of ideas on this now and have a general reference. Later we can discuss these two catagories and compare one to the other. Let's ponder this as we go along. Perhaps later we can come up with some better feeling as to where we are on this situation. Incidentally, there is another thing I would like to point out - the fact that any time you speak you need not refer to your own institution; use an example if you wish. I would like to to think in terms of the national scope, rather than your institution. We shall keep the discussion in terms of the idealistic form as much as possible.

2 - 24 John, I would like to hear some further discussion on this page 7 question. I would like to see if we can catch some of the broad-drifts of development that are taking place. We are seemingly making advances. What are some of the barriers to advances? What is the wave front, as it were, in this particular area? I don't know whether we can do that or not, but I would like to hear some discussion.

6 - 25 You bring up a point. Whenever we say educational television we have a feeling that we are talking about some kind of a direct teaching process. It seems to me that when we talk about educational television in broad terms, and not about closed circuit instruction such as we see here (Hagerstown), we have a responsibility beyond direct teaching--or even indirect teaching. It seems to me we have a responsibility to supply a service to the people which is far superior in every respect than that now supplied by commercial stations. Do I make myself clear?

4 - 26 This is what is involved in the community, in your community relationship.

6 - 27 Yes--in a so-called open circuit operation. Include entertainment if you like.

9 - 28 This is the concept which, as everybody has indicated, is the one that's really hard to sell. You can show that it is more economical to teach students by means of television; you can get almost anything you need (within reason) to do that job and you can get all kinds of support. No one much criticizes you because, in the first place, you are within a kind of closed corporation - a sort of guild, if you like, which operates under some rules anyway. Nobody knows a whole lot about it (even the people who are in it don't really understand it too well most of the time). Just as soon as it gets to be a big educational system of any kind (whether a school system or a university, although I suspect that it's more true of a university), it's such a closed corporation kind of thing that nobody really even knows or cares too terribly much exactly how these things are achieved. As soon as you step over into the area that Carl Menzer was talking about though, you stir up innumerablehornets' nests which otherwise are busily preoccupied gathering their own honeys. The question as to whether government agencies, (and most of us around the table represent government agencies of a kind) or volunteer agencies, which (somebody did point out) are kind of unique to America anyway, ought not to be messing around with communication media. This opens up a whole world of problems, apparently, and I don't think this situation has improved any in the 10 years or so that we have been working with this. I think we have got a little more acceptance on this point by sheer dint of brute force and strength, screaming, fighting, and kicking our way to getting stations and getting them on the air and keeping them on the air. I don't know that the general acceptance of this thesis is any farther along than it was, well, six years ago, anyway, when the first stations got on the air.

12 - 29 Well, in the face of mounting educational costs, it may be pulled up as your cultural programming, as another frill of adult education and you say, "All right, we're just adding, we're not pulling down the costs any; here we're just simply adding another activity in adult education or extension, and what basically do we have for our facts in terms of our real business of (TV) teaching?"

10 - 30 It's just a matter of cost. I think it's the whole matter of resources which is the problem here.

12 - 31 Indeed it is.

10 - 32 It's the personnel situation, the cost situation. Increasing enrollment and lack of facility in buildings; all of these things are crying and then somebody comes along and puts it up to adult education.

V - 33 It's the self interest factor!

9 - 34 Small institutions, which face these problems, are unable to solve them as do the large institutions which are going to closed circuit. They are just as reluctant to support community television activity as the large ones are . I say this with very deep feelings because I just came out of a series of meetings of this kind. Nobody wants to take the responsibility. This is what you were saying, Dick. Nobody wants to do the job.

12 - 35 Let me give you a hypothetical case, if I may; the case of investigating whether or not certain basic general education courses might be given via television in a community, only to find out, as one begins to plan this, that junior colleges are attempting to float a big bond issue to build another junior college! What would such a television program do to the interest, should they want to build and entirely new junior college campus?

2 - 36 Now I think this exemplifies the problem, but I would like to open up a question. Do you know anywhere in the country where, instead of building a conventional junior college, or several of them, the possibilities, the extensibility that television is used to modify the plans and the bond issue? Isn't this one place where we're still on the periphery? We haven't moved television into the "main tent" of education, not in the "main tent" administratively, budget-wise or otherwise. It's still thought as an extra. Isn't this one of the problems? I am sure it is in Pennsylvania.

9 - 37 Well, of course, the closest thing that I can think of in the country (and it is still a long way from that point) is what's going on in Florida with the inter connection of institutions.

12 - 38 We might add Oregon to that with their junior college of the air.

9 - 39 Well, there are a couple of instances there of that kind-Chicago and North Carolina. In Chicago they have about three years of experience with this; in North Carolina this is the ending of their first year. They are providing major portions of the first two years of college and, in Chicago's case, all; so that you could,theoretically, get an Associate of Arts Degree by television in Chicago. This is the goal in North Carolina. I don't think, however, this has in any case modified anything; in fact, Dean Erickson, in describing this process, proudly refers to the talk which he gave to the junior college administrators in the Chicago area before this thing started. He said, "This is not going to cut your enrollment; it is going to increase it some." So you see, this has not affected (in that case) the main stream of students.

4 - 40 Can the junior college be sure of that, from their standpoint, right now?

9 - 41 Well, they are in Chicago, apparently.

4 - 42 I would think that in my area that the junior colleges are not quite sure of what their positions might be. Therefore, they wouldn't know how to modify yet, because we haven't been involved in this soon enough.

9 - 43 Isn't one of the questions here going to lap over into facility rather quickly? Dr. Carpenter won't like that, but I don't know how he can avoid it in this particular case. One of the problems here, it seems to me, is, if you're going to provide any real, satisfactory situation for the normal junior college thing, you've got to have the ability to program more than one program at a time. Normal broadcast television does not meet this problem, face on! Airborne television does and our proposed microwave linkage program does, we hope, ultimately. But these are two untried experiements and are really not in a position to demand too much of a change in the approach to the problem. Now there is one place where the thinking, not at the junior college level, but at the entire university level, is going into the real heart of the problem, apparently, and that is the Boca Raton University in Florida.

2 - 44 You could use Houston as a better example of an institution; Boca Raton is being planned.

9 - 45 Yes, I guess that's right, you can think of it that way. I think they have effected, to some extent, the structure, but they've also shown up the weakness of the single channel problem. In that, from much of what they have done, they are still unable to salvage the University of Houston from it's basic fiscal problem and so even the television operation is being cut back in the interest of trying to keep the institution going.

0 - 46 Well, what is being said is that there are two problems. One is the facility; the other is the economic problem. Educationally, it looks as though the TV system is in some difficulty. Can the job be done adequately by educational television, by the television medium?

4 - 47 You mean the single station doesn't have enough hours a day to program to do the job?

9 - 48 That's really right, that's the crux of the problem right there.

0 - 49 What about this FCC situation? You can have multiple stations. Might one proceed with the 2nd or 3rd channel?

9 - 50 Now, of course, you can do what Engar is doing in Utah, using translators, giving himself the opportunity of programming as you do here - multiple channels. This offers a solution, but not to the Houston problem, because translators wouldn't work in that large a metropolitan area. Engar's physical situation is much less demanding than the University of Houston situation.

4 - 51 You mean cover the entire city?

6 - 52 John, in Adler's plan for the use of translators in Hagerstown, how many channels would he provide?

0 - 53 Adler proposed a four channel system for Hagerstown. This system required four repeaters at two out-county locations to cover the bulk of the county. We would have had four transmitters installed at the Board of Education, four in the southeastern section of the county and four in the western section of the county. Two problems confronted us. We would have had to apply or petition for a rules change (or a provisional grant) which is one problem; the other is that we took a dim view of getting a favorable reaction from the FCC due to present rules and the number of frequencies we needed to do the job. Word came to us that surrounding communities would be boxed in if we usurped so many channels - 12 in all. We also had the obligation of having been committed for a six channel cable system.

9 - 54 Well, the dimensions of this problem are best described by what decision Airborne had to make before it ever put the first transmitter up; to go to three megacycle band widths in order not to use up all the spectrum space.

4 - 55 John, are we bringing in another point here? Are we bringing in the point of programming, if I may use that term, for a specific classroom and, on that basis, not having enough time in a day for a single channel of the need to go to multiple channels? Don't we have also the opportunity of more than one class banning together or compromising so that there are multiple classes watching the one program rather than specific program for a specific class? Wouldn't that help on the broadcast day?

2 - 56 Well, you have that anyway don't you here (in Hagerstown)?

0 - 57 We go a bit further in combining grades 4, 5, 6 on a French lesson. That type of thing is a little closer to what you are saying, is it not?

4 - 58 I'm just trying to say here that perhaps the fault might not be entirely the single channel; it might be partly that there is more specific programming than there might need to be. More people would have and could have more - for any given lesson.

0 - 59 Here is another twist to the same thing, offering, say physics for juniors and seniors one calendar year, one academic year; the following year offering chemistry to two groups. That way you're doubling the number of people you're reaching through the single facility.

V - 60 Which are the two groups?

0 - 61 Well, for example, take juniors and seniors. One academic year you would offer physics and the next academic year chemistry. That way you could group two grade levels simultaneously to reach a larger audience. Really we are talking about facility versus audience. Is that not the case?

2 - 62 I do think we've drifted a bit - we're talking about facility as needed to serve a simple educational function. I think the definition and specification of the requirement of the educational function should determine the facility. Too often we've put the cart before the horse! We put in the facility and then try to find out how we could use it. There was a former time, I think, when we lacked the very ability and flexibility of systems as they've been developed over the past five or six years. I think we can now "tailor make" systems from many points of view - that is, from its flexibility, its scope, its cost, etc. in relation to available equipment; it has become much more variable. Five or six years ago we were thinking essentially about more uniform and less flexible, less variable, types of facilities; but I think the primary consideration is, what do you want to do with it?

9 - 63 The answer to your other question, "Who is trying to make the institution in the shape of what's available to do the education job?" In other words, instead of taking the physical plant of an institution and implanting television, etc., there may be other things more important than television. That answer really is Boca Raton; here they are starting out with $600,000 for planning; the notion is to plan the institution in such a way as to make the fullest possible use of what is presently available and what is projected to be available in the way of aids of this kind. That's the only case I know where this has really been done.

10 - 64 Do you feel that the array of existing facilities is such that it can serve adequately the variety of functions which exist in education as you find it in this, that or the other institution?

2 - 65 In some of them. Of course, you come up against the problem, what can it do and what can't it do?

10 - 66 Yes.

2 - 67 I have a very strong feeling (this probably should be stricken from the record) that at times, we have to speak a certain language of diplomacy. I think the time is upon us when we have to speak the language of the human engineer rather than the language of diplomacy. I refer to supplementary teaching, the fear of reducing the enrollments (for example, in the junior colleges of Chicago) because of television. We've got to face up to the facts of this situation. Those junior colleges are soon going to be saturated, and it will be a question of how you manage to give the best possible education to the numbers that qualify for it.

12 - 68 You move beyond enrichment?

2 - 69 Exactly! I think that as the need increases and becomes more obvious to everybody, I think we can drop our language of the engineer; that is, here is the job, how do you get it done with the resources available - human and otherwise?

12 - 70 And then, the teacher sees that under these circumstances he's still, in the last anaylsis, in command of his class.

2 - 71 He still has more than he can do, you see, as the needs increase.

9 - 72 It's the analogy of broadcast versus newspaper news. I think one of the problems I would like to see entered on this page is that the lines are being blurred between the classroom and the school or the institution. The lines are being blurred and intermixed, as it were, between the schools and the community and the lines are being blurred between the formal and informal education, by some of the operations I see, being mediated by television.

12 - 73 Should there be?

2 - 74 I think this is good, but it won't solve the faculty feeling.

9 - 75 I'd like to see some illustrations of that.

2 - 76 Well, starting with the classroom - I mean, our TV classrooms are open. I don't need to dwell on that - I mean, how other faculty people see it, other students see it. Students sample courses before they register for them.

9 - 77 Well, this isn't blurring any lines between them.

2 - 78 It's blurring the lines between the closed classroom and the rest of the institution.

9 - 79 But not between formal instruction and - - -

2 - 80 I'm getting to that. That's on down the line. I think when we put on a real authentic course, college course, we don't modify it, but we invite the public, some 30 or 40 thousand of them, to look at philosophy being taught, or sociology, biology - including biology of sex! This is blurring the line between the institution and the community.

12 - 81 What is the community reaction?

2 - 82 Very good. A few "crack pot" letters to the president - three or four - which he correctly ignores.

6 - 83 How does the viewer's reaction to these programs compare with that from commercial entertainment?

2 - 84 This is something that would bear some discussion; I don't know whether it is the kind of discount factor operating here or not, but college professors have a certain tolerance from the public, a certain different category of acceptance from them.

12 - 85 They want it technically to be good, though!

2 - 86 They want it technically to be good. I think that we need a little more literacy in the mass media which we don't have at the moment; you have a discrimination being made between categories of TV programs. This, I think is one of our big problems to develop; develop the kind of literacy in this medium as we have tried to develop in certain other media.

4 - 87 Sometimes you run across a faculty member who, when you contact him, says,"No, I don't think I want to offer my class for credit." And if you press him he will tell you the reasons why. If you want to offer approximately the same class, using the same materials, and you put this on open circuit to try to reach the community with it and the credit is not involved in it, he says, "I'm all for it, and I'll do it as a volunteer."

2 - 88 Now this is very interesting.

6 - 89 I am interested in knowing more about public acceptance of this type of program compared with commercial entertainment.

2 - 90 Now we had (for what this is worth, and I hate to talk about a specific example) a course on economics which, in some respects, is a liberally - taught course by a professor who was judged to be liberal (at least a few

years ago); no reaction! Sociology, which has a section in it on primitive religions and comparative religions, is exceedingly sensitive from certain points of view. We had no adverse reaction.

6 - 91 You say no adverse reaction to such programs on closed-circuit. I still think you might get some if they were aired on open circuit.

BREAK

0 - 92 (I suggest that we use 0 to 5, 0 meaning nothing and 5 being the optimum situation as we can envision it today.) I want to comment that I'm not searching for institutional committments; rather I want to take advantage of the experiences you have had in your work, in your professional and special duties, in your travels and in your contacts with other people. I would like to use the word "think" and ask you to project yourself into a situation wherein you can think in an idealistic way as to what the problems of educational television really are, and how we are going to solve them. For the moment Carl Menzer has the floor; have you lost your trend of thought, Carl?

6 - 93 I probably have. I think we were talking about general community acceptance of direct classroom broadcasting compared with commercial entertainment. I hate to be the devil's advocate but for purposes of discussion I think the percentage is very small.

4 - 94 But it (the educational television broadcast) is there and viewers have the choice; more and more might turn to it once in a while. I think we are dealing here with a selective audience and we know, in this case, that people may not tune in for an entire evening as they would to a CBS block. Nevertheless, it is there and once in a while, then, they have this opportunity. As it stands now, at least in my area, it isn't there at all. There is no choice.

6 - 95 OK then, let's get back to my original idea: I think we can present material, which we class as educational, in a manner that would be just as acceptable to the average viewer as anything the commercials can do. Just exactly what form the presentation would take or how much it would cost, I don't know, but I think it can be done. If so, we would be discharging our responsibilities to the community.

4 - 96 Are you sure you don't mean competing for rights?

6 - 97 I mean supplying a service that is not now available.

9 - 98 I might rephrase this. To me, this is what you are contemplating. Is it the product we are promoting or is it the way we package it? In other words, we are asking, "Are we appealing to the public? Are they watching it?" Is it a problem of how we package this message? In other words, how do you capture your audience?

6 - 99 As a matter of fact, it could be a problem of packaging. You might even say, "Let's develop a gimmick to put it across."

4 - 100 Are we using the network as a frame of reference here?

6 - 101 Well, you have to use some comparison and I am using the network because I have nothing else with which to compare.

11 - 102 Of course I reserve this for a different set of standards. I am constantly trying to dream, to a very large extent, in isolation, to developing what might be traditionally called "production standards," which are a kind of hybrid of some of the best in educational programs, some of the best in commercial programming; but nevertheless, it would be a distincitve kind of operation which would be recognizable in terms of its characteristics. I think this can be done by setting our sights on this as the objective and getting enough magic and brains together to do it.

6 - 103 That's what I mean. I have never actually seen it done to the point where I would say "This is it," but I do think it's possible.

4 - 104 Who is competing with commercial TV? You are, are you not, Mr. Willsea?

12 - 105 Yes.

4 - 106 You are, aren't you, Bob?

8 - 107 No, we're not.

4 - 108 How do you stack up, Mr. Willsea?

12 - 109 Well, first I would like to know. I think you use just words when you say we have a smaller audience. Sure, I think we do, but how much smaller and how do you know? I think in the afternoon shows, for example, a survey that was done by one of the commercial outfits last year, (I don't know if it was ARB or Pulse or whoever, we don't subscribe to it) one of our friendly commercial stations let us see it. The only station that really out-stripped us badly was CBS in Denver. We about equalled NBC, we surpassed ABC; the fourth station in Denver we out-stripped also. I think that there are times - I reconcile myself to this; I am sure that most of the people in our operation have - - - there are places where we will have a large audience. We go out after a large audience. For example, when we put on the Denver Symphony we know we're going to have a large audience. There are places where we will have a small audience and we know this ahead of

12 - 109 time. We just finished doing a series of programs that were planned for a highly selective group. I am sure that this is true of nearly all the stations over the country, nearly all of the ETV stations where you will have a large audience on some of your programs and a small audience on others. We know this ahead of time. This doesn't bother us. The thing that encourages me is that we are growing, at least in Denver, and I am sure other places too, in the following we have, a little bit each year. We know this. On the basis of some survey work that we did, as long ago as about three years, we figured we had somewhere between 75 and 100 thousand people who, sometime during the week, saw something on Channel 6 that they liked and followed it rather regularly.

4 - 110 And isn't this a major purpose of our share of the block of programming?

9 - 111 This increases literacy in our ranks.

12 - 112 This has grown again on the basis of some survey work we've done as recently as last year to where we know we have somewhere between 125 and 150 thousand people who, sometime during the week, find something on Channel 6 they follow rather regularly. Now we regard this as an extention of all the educational facilities, whether it's Opportunity School, the University of Denver, the Denver Public Schools or whatever. So, you have certain kinds of classes in a school, in a college or university who have limited appeal but very regular appeal. You'll have those kinds, the afternoon shows I'm thinking of, where we will be doing a very broad area of homemaking etc. I am very sure that the commercial stations in Denver would give their right arm to have the community response we get that half hour every day.

11 - 113 I'm not quite sure what you're doing here. Maybe it's because I came in late. What is the relationship of the outline to what I'm hearing? I want to make some useful comments.

0 - 114 OK, let's restate it again. The purpose of this meeting is to try to come up with information which will help us toward successful completion of the N.D.E.A. contract we have (per your letter of invitation). Basically, we want to cover technical facilities, equipment and requirements of educational television installations. This is the problem, the challenge I keep coming back to. I am trying to make recommendations, take a stand, defend, if you will, the technical facility and how it is to be used.

11 - 115 Well, yes. Open circuit or closed circuit?

0 - 116 I don't care what it is. What Willsea has said here is just as true of closed circuit as open circuit, classroom presentation or adult educational broadcasts; you are to capture and hold your audience, are you not? Have you pleased the audience? Have you really gotten through to them? Now, Harry, we are very informal. This outline you have before you is merely something for a point of departure. We have, in a sense, worked on page 9 a good bit. There are other points which will come up later which are in part answered already or have been discussed. But let's don't throw ideas away; let's use them.

In other words, any contribution you wish to make, take the floor; we'll keep it informal; you don't have to address the Chair.

11 - 117 I have a thought but I don't know whether it is relevant; I think what you have said now - - -

6 - 118 Might I suggest that we are more or less dividing educational television into ETV as representing open circuit community broadcasting and ITV as representing direct instruction to the classroom either open or closed circuit. We got off on a tangent discussing the responsibilities of the broadcasting station to the community.

11 - 119 Yes. I think we all know educational television which started off essentailly by the FAE in this country. Very little direct classroom broadcasting was involved in the early days. We saw it as an adult education facility and in extension departments of universities and things of that sort. Later, with recent grants, operations swung very heavily to the Hagerstown type and a great many similar cases. To mention a few, St. Louis and various areas, the whole operation has become almost a closed-circuit by broadcast facility. So I think it's related to what Carl and the rest of you were talking about; that is, the audience in the educational radio too. We found that you do have a minority audience (for educational radio and television), but you have, quite largely, opinion leaders. Sometimes the numbers are not so terribly important. I would like to have us keep in mind the use of these facilities, with considerable recognition of the fact that the crises our country faces is so great, that we can't wait for all these kids to grow up! So at a certain balance in adult education and continuing education, and even after they grow up, 90% of what was learned in school is no longer useful for decision making in 10 years and so the tradition of continuing education is a very powerful one in addition to the equally admirable and probably more pressing use that we find at Hagerstown and in other places.

4 - 120 And yet as we've mentioned, in a practical country, at this time and at this very moment in our development, here is where the legislators and legislatures peel off, as they look at the adult education on one side and the formal education on the other.

11 - 121 I think that there is a public relations job to do, and just to finish the remark, I do think that if we do take that balance, we're not going to have to worry about general audiences. I think that sort of material can much more easily be dressed up than direct algebra or something else that's in here. I think that we've got to get through to those opinion leaders and we've got to design dramatic programs which present the facts of life about education, about public affairs and all the rest of it, so that we are useful to the community at that level

II - 121 which yet has not been particularly remunerative. That's the area we're going to have to open up.

2 - 122 I'll take another run at this same problem. In education we talk a good deal about generalized learning - what they learn in the classrooms being generalized to practical applied situations, etc. It seems to me that we haven't given enough attention to generalizing learning habits.

II - 123 That's correct, you need to learn learning!

2 - 124 Now look at television and take the kids in the classroom here in Hagerstown. If you develop a learning habit, systems which are connected with television, you open up perhaps, great continuity possibilities between the school systems and learning after school or after college (by TV) because it's essentially the same kind of thing; whereas they can't carry classrooms around with them; although we sometimes try to provide them under very awkward circumstances. Television could be there, so here is the kind of a general possibility, the general learning habit which might be worth taking into consideration.

0 - 125 (After admitting late comers)- - - We are recording the proceedings in order that we will have a record of all the ideas which are to be discussed. We will give you a copy of them after they are transcribed. You will have a chance to alter and modify the text from the statements which you recognize. We want to be informal, and I would like to think that we're not doing too much "old hat" thinking. Let's be careful about bringing up old problems with which I believe most of us are familiar in terms of our present and past experiences. Let's take advantage of this opportunity to exchange ideas in terms of where we are, where we're going and what we need to have educational television at it's best. What can it be; how can we facilitate this problem we have in terms of equipment and utilization? Let's don't worry about whether Joe had a good lesson on arithmetic and that sort of thing. We are trying to avoid misdirected opinions; we're talking about the whole facility of television as a communication medium. We want you to speak informally. Take the floor when you have an opportunity and use the doodle sheets you have in case you aren't heard! You can at least be read, see! I want to look over these doodle sheets after the meeting; we'll send them to you by mail after we have captured the best out of what is written on the paper. I'll not use any quotes from anyone without permission. Should you feel you have a significant statement written, and if I feel it's significant and I want to use it, we'll negotiate further, privately, as to how I might use it. For the two or three people who just arrived, refer to page 7. We have tried to set up some question on these pages as guides for the conference, addressing oursleves with a number of problems; where are we in ETV, where are we going, where should we be now? We would like, some place along in this conference, to come out with a relative

0 - 125 position. We are using 0 to 5 as a catagorical reference for convenience - 0 being nothing, 5 being an optimum position of ETV at the moment. Where do we stand facility-wise, in terms of equipment available? Secondly, how well are we using it? Some place later you'll have an opportunity to state your feelings about our relative position. I hope we can dream of some things that really are handicaps, limitations - technical as well as personnel limitations. So we are sort of between pages 7 and 8. We started off with this concept on page 7 and we're sort of touching on this problem on page 9. Present equipment - what is the equipment needed to do the job? Are there different catagories of requirements - one for the closed-circuit arrangement, another for open circuit? Are we talking about a common kind of equipment? A question which comes up frequently is, will vidicons work here, image orthicons there? Can either be used in any operation? This sounds like a "nuts and bolts" program; maybe we can work it up as a group of equipment. I think what we are talking about is a kind of professional proficiency in terms of technical equipment. Must it be image orthicon, must it be professional vidicon? Can it be any camera that runs random sync and makes a picture? Do we care about the picture which comes out of these cameras? Are there areas where we must have a minimum standard of equipment? Are there areas which are less demanding? Does anyone want to make a comment? I would like to state this as a question, what about the professional vidicon equipment? Is it acceptable as a medium in the television operations, in broadcasting, closed-circuit, or however you might wish to use it?

3 - 126 John, don't you think there's a difference between these, immediately, that we could take into consideration? What is the end product, where is it going? If we know (for example) that it's going to be recorded, technically it cannot be recorded from any vidicon equipment. This is one thing your going to end up with. I don't know if you're doing it at San Diego or not.

0 - 127 Yes, Ken Jones is recording from vidicons on film. Hagerstown records vidicons on tape.

3 - 128 Well, this I've never seen. Speaking of NETRC, they will not accept this as a standard, and it depends on what you're going to do with your end product. If you are going to use it, if I am going to use it, are you going to let it go to other schools? This, I think, you should divide and then talk about it. I would be loathe to say that if you have anything coming out of there that I would certainly recommend image orthicon equipment. Wherever we can, we want to do the best job with the best equipment we can possibly get. I think at the same time we want to recognize that where the job is being done for one reason or another with vidicon and where we meet certain standards for picture quality, that it can be done.

0 - 129 Who is to judge this picture you see, that is the question?

10 - 130 This is where you're going to start static! You're going to start with SMPTE.

1 - 131 I would like to ask a question, John. Have we yet isolated exactly what we're talking about? What kind of television are we talking about?

3 - 132 Yes.

1 - 133 Are we talking about broadcast, in-school enrichment, or what?

0 - 134 Let me turn the question around, is there any difference as to whom we're trying to reach? Doesn't the signal have to be as good in the classroom as it does in the home, open circuit or closed circuit?

7 - 135 Well, your subject matter will vary over a tremendous range.

3 - 136 We're not talking about subject matter. We're talking about your end product. I would say that with vidicons, if you're just going to use them directly on monitors, yes, I would go along with you. That seems to be very fine, but I have not gone into or have been able to find vidicon equipment that would come up to broadcast quality. I know I just went out of it into I.O. I had all this mess.

9 - 137 We started on the philosophical base that you had to have image orthicon equipment for closed circuit just as you did for broadcast because you had to have technically as good a picture in order to satisfy the subjective image which the student has, of what he is seeing and comparing unconsciously with the broadcast picture which he sees on the same kind of an instrument. He knows if it's not good; our feeling was, and still is, that the acceptability of the product would suffer with the student. However, I don't think that's an absolute position. I don't think that's one we would maintain absolutely and I don't think it's one you could defend absolutely, because you have all kinds of situations in which to use this equipment. This is where this type of question gets to be hard to handle because we feel now that we're worrying about duplicating video tape. We're not very happy with standard 3" image orthicon; we're worried about 4 1/2" image orthicon. Yet we were perfectly satisfied with image orthicon for broadcast purposes.

12 - 138 I don't think we ought to let people think that vidicon cameras can be a complete substitution for image orthicons. But on the other hand, I think that we certainly should, where we have so proved it, show that vidicons can do a good job and accept it.

3 - 139 That was my first statement.

11 - 140 - - - and I would hate to have us ignored.

3 - 141 It's an end product which is being used. Whether to monitor a system (because when we first changed over we had very fine equipment luck, I would say) you're using the same thing. Yes, first it was nothing; it comes with paying the people there who can handle the equipment. When we changed things

3 - 141 from vidicon to I.O. it took six months until the thing settled down. We had a worse picture with the I.O. than we did with the good vidicon for a time, but the I.O. will give you a better or equal picture with less work. That's what I meant.

9 - 142 We have gone to light and in so doing we have gone as high as 400 foot candles. We don't believe 150 to 250 feet are adequate for telecasts. Then comes in the recorder again with the word expedience. Possibly you can't sell I.O. to everybody.

6 - 143 I'd like to repeat what the Ampex people told us this noon. Perhaps some of you didn't hear it. They said that the characteristics of the vidicon picture more closely approached the optimum for recording than did the I.O. picture. Considering the development that's been done in vidicon tubes in the last few years (and is continuing),I'd be loathe to have any sort of recommendation come from this group to the effect that vidicons are unsatisfactory.

11 - 144 Out at Penn State I've seen TV when it goes out to broadcast stations etc. I've seen both I.O. and vidicons on home screens and things of that sort.

4 - 145 Here's a psychological point I think we should remember when going out by microwave. Those of you doing as we are ,originating remote telecasts for a commercial station are in effect satisfying (depending on the number of stations you've got 1, 2, or 3 men and the chief engineer) a human failing; they (the broadcasters)want something at least 10% better when they're accepting it from us than what they normally accept from their own staff, and you've got to have it there.

2 - 146 I didn't want to get in this argument but I'd like to make about three comments. Number one is that I think we have not yet made a definite comparison under conditions where comparisons ought to be made between several different systems and combinations of systems and this is something I think someone ought to do. We are off base, therefore, because we've made no comparison between vidicons and I.O.'s. Now this is one position that might be worth putting in the records, but if we're going to have judgement about these things we'd better set up conditions where we're going to set up equipment just as we compare learning in classrooms and I don't think this has been done. We have partisan points of view and it's usually what we've had success with that we promote. Now the other points I'd like to make are, number one, two years ago we were very,very skeptical that we could put a picture on a broadcast station and make it compatable with the I.O. and other programs. Now our programs, perhaps to impart the fact, have a pretty good engineering group working on the equipment and are better on the average than the programs that are coming over the I.O. On the question of recording we can't say about Ampex tape, but we do get a very satisfactory check-line for our purposes, via film. Now the center won't accept them but they're doing our job and doing it very well.

3 - 147 I have one (kinescope recorder) sitting in the corner and I have the same equipment you do, but I'm selling my machine. We use the vidicon for highlight sources with which we now feed the kinescope recorder.

2 - 148 This hasn't been easy. It's taken us two years to develop this, and on the other hand, we work it out with the process labs to get the lighting correct along with a whole range of other things.

12 - 149 It seems you've all been talking about one thing here and you haven't come right out and hit it. I would be reluctant (I'm not an engineer) to recommend one kind of equipment as opposed to another just from listening to the conversation. There are people who have pretty good success with each kind of equipment, but I think one of the key considerations in this whole operation is the kind of people you get to operate it. And I think this is where we sell oursleves down the creek or allow ourselves to be sold down the creek by somebody telling us, "You don't need professional people, you don't need qualified people to get into TV and do this thing." It's our feeling that if you have quite a bit of money requiring a lot of highly developed kind of technical skill and know-how, that you'd better get the best kind of people you can to run the thing.

7 - 150 Well, I think the fact that the various experiences expressed with the various types of equipment express the point of view we cherish, because in every case where good results have been obtained, it has probably been because the men operating it knew how to make it work properly. It's ridiculous to blame a vidicon for a lighting problem.

12 - 151 Absolutely correct. I had a person tell me, within the last year, that they are using high school students to do maintenance work on camera chains.

3 - 152 This is stupid.

12 - 153 Well, but if you asked me, this person made quite a pitch out of the thing. Everyone of our people is qualified and I'm sure we're no exception. I'm simply referring to the operation I know best. You know, John, that everyone of our technical staff is a qualified engineer, technician or electronic technician. I think you get what you pay for, personnel-wise, equipment-wise and everything else.

0 - 154 Maybe you think these things aren't important but I've got reasons to think so, everyday. People come here and see these vidicons. Often they say, "Well, I talked to so and so and he said you had to have Image orthicons." Well, the image orthicon makes a wonderful picture as has been said. Vidicons, too, work very well. It is a different kind of picture, a different quality. Now, how are you evaluating the quality of a picture? What is your reference? You see, as Ray pointed up so skillfully, it's a matter of comparison, a different kind of picture. Can you defend your choice?

5 - 155 The Airborne Project does. By their standards they flatly refuse vidicon.

0 - 156 Now here is a problem, you see. Institutions like Y and Z are contemplating installations. . They are looking for people to help them and they call for advice. Perhaps vidicons will do their job. Will NETRC and Airborne refuse to accept video tape from vidicons? We have to realize here that people who are going to spend money, want to make the right investment. Unless you know their entire program, how should you advise them? You don't know how to help them. As soon as you start talking money it's precious, the decision may be forced!

1 - 157 John, I think we must go back to my original point. What are we talking about, what use? Are we talking closed circuit for direct instruction - enrichment? Broadcast for direct instruction for adults? If you're doing general audience program service with ideas of recording it, you are competing with commercial broadcasters with I. O. cameras. I think there should be some narrowing down of what we've been talking about specifically because a given camera will do a good job in a given situation.

11 - 158 You often make use of something intended for one thing; you use it in a secondary after-thought way for something which is really more important, after all. I happen to think about this just as the way we talk about this vidicon tube over the air. You ask, "How do you like this professor etc. ?" Well, the first two or three minutes you notice that the guy is odd looking, but after you are into it, you are over the hump and this no longer makes any difference for understanding, for following - unless the technical quality is so bad it gets in the way.

12 - 159 Then you call attention to it.

11 - 160 That's right - - - if I may say so. But I do think that engineers are judging by the standards. We say look at the light ratios (grayscale), we are (I won't go into the jargon and get it mixed up) making a mountain out of a molehill. I think of it's intelligible, if it's clear (noise free etc.) then we'd better be able and willing to recognize both of them and I do feel we cross that line between the intended and unintended or the secondary use so often. So often, later maybe, something develops. They are going to have to go back and record all these because the first ones are on vidicon. Aren't they equally useful? Or vice versa?

4 - 161 If we are going into a station from a remote, say a studio on the campus into a station broadcast operation and the picture is not the quality the chief engineer of that station wishes to accept to give out to his audience, it's going to color the entire relationship to everything. There's going to be the carry over, the bad technical qualities, therefore it's a bad program. But I'm with you, Skornia, if we say it's enough, if it will meet these people's standards and they will accept it, then I think we are correct.

10 - 162 The relationship with the engineer is an entirely different problem area it seems to me. These things need to be evaluated technically, first of all, and in terms of educational impact. What can you do to accomplish the purposes of education with this, that or the other item of equipment? If we lose sight of this when we chase off on problems of public relations, and heaven knows how many others, which may or may not be related strongly or tangibly or some other way to this educational impact. Our purpose, it seems to me, always is to achieve maximum educational impact; you can do it with vidicons, in some situation you can do it with orthicons. Maybe in order to have any impact at all you have to please the engineer. Well, this is something that has to be considered, but it's a different class of problem, it seems to me, to know what can you do to people with this communications message.

3 - 163 Can I give you a real solid example which happens to be? I didn't take over this particular property until last July. I interhited a situation. He (JRB) knows it or about it. I think it's the naive-day of the individual who is trying to develop. I don't care what he's going to do with it; I don't care if he is going to put it on closed circuit TV or whatever; it's the naive thing! I think it's the one thing we must let people know they cannot do it in their approach to the whole problem. These people I refer to went out and spent good money, real good money, but they had the idea the only thing they needed was the house, the facility! John saw what we are in, which number one, has in it right now, in cost and upkeep, now let's get this: I'll give you a figure - $83,000. I have a sorority house and, absolutely, the ceiling wasn't as high as this; but remember there was $83,000 in this. These are the people we are talking to. You might have invited some of them to this kind of meeting - - -. Then they bought this equipment; all they had to do, they thought, is to take those cameras, put them in a room, put the instructor in front of them. We'll get this recorder(which they got for $38,000). They made 100,000 feet of film, of which 100,000 feet was thrown away last July when I came in and --- could not use. Another thing is that we were in the hole so far that there are communities into which I can't go because they still have this bad taste in their mouths. Now this is the thing that has happened to these people and I'm not saying that I've heard about this; I have it here - public relations-wise - I have a whole year of work and people are just beginning to see now; that's why. Now they're saying, "I didn't know you could do this." We have to even be better than broadcast and right now we are and we will stay that way. But the one thing that I want to know is, who are these people that started these projects? Why should somebody else be found in a hole, when he says - well, it's real easy to etc., buy the camera and put it on the instructors etc., etc., we'll make the film, we'll use it. This is the idea.

4 - 164 People started in TV programs that had no business starting in the first place.

9 - 165 The first peice of equipment you need to do the job is knowledgeable people.

3 - 166 I was invited back to this particular place and shown this great big building. Why even friends of mine, I lived in town then, tried to talk them out of this. I could take you down here to the manufacturing plant and they could impress you with all these parts.

4 - 167 When we were looking for equipment and trying to get what we could within the budget, and within what we were allowed, we would go to equipment salesmen with specific questions; with a good percent we had to cross our fingers and answer only after we had our own equipment budget.

5 - 168 Well, I could document Claude's story here with another situation up in the New England area that's about a year old, too, and they are in the process of another changeover.

3 - 169 I'll go one step farther if you want to. I had a whole strange new staff; there was a person who came in and didn't have one person with a first class license. In the first month we changed people.

0 - 170 I want Fred Remley to sum this up or make a comment. He's sitting on something here.

7 - 171 I'm really not, I seem to react somewhat to all that's said and it's going to be hard to put it all together. I think the comment about hiring a consulting engineer is good but doesn't go far enough. It would be preferable to hire a consultant,and to hire the man who's going to operate and work with the equipment before it's ever delivered and have him work with the consultant in planning the installation. As far as equipment salesmen go, I think they've done more disservice to Educational TV than any other single group except for the self-appointed experts in television education. In any case, I think the whole point of John's report, or a large part of it, namely equipment, should be something that can be used as a tool.

9 - 172 It's a means to an end.

7 - 173 That's it, exactly. It's not something that should set limitations on instructional content; at least in the first approximation. It should allow you to do everything you've planned ... Therefore, I don't see how this group can come up with any specific recommendation to the type of equipment except to say that each application has to be considered individually - carefully, very carefully.

4 - 174 Get your man early and pay him well - - -

12 - 175 There's one other thing to go along with Fred in tying in with what Harry said awhile ago. When a production is designed for one specific purpose, and then eventually you find it doing another specific purpose, this comes to the question that John asked awhile ago; shouldn't all these things, regardless of whether in the school or general telecasting, whether it is vidicon or whatever it is, the quality of these things should be as good as you can possibly make them because of the eventuality that although it is planned today for closed circuit telecasting, tomorrow it goes on another station via tape or something or other, and it is the guy who watches it in a living soom someplace who says, "Well, the reason why this isn't as good is because it wasn't intended to be and could never go on a general telecast system." He doesn't say that, he says, "My gosh, what a lousy picture this is."

V - 176 Right.

4 - 177 And like the trouble you mentioned awhile ago, non-standard cameras, the real cheap cameras, you can't broadcast a picture from them at all. I'm sure there are a number of people who are going to be stuck that way.

4 - 178 There are stations on the air with I.O. cameras that have tubes in them so bad that they keep chasing them all over the place.

12 - 179 Quality equipment, quality personnel and quality production are the main things; when put together can make a pretty good show.

9 - 180 To come back to Ray's point, perhaps we were saying that as long as our equipment will do this and that we cannot be accused, as many Hi-Fi bugs can, of listening to an amplifier instead of the record, because they are so involved in equipment. There is the fine line, that's where we peel off from worrying.

0 - 181 Have we satisfied the question or do you still think we have something here that stands out as not having been settled? I think the institution that is deciding or desiring to buy equipment, should get service from consultants in engineering as well as someone familiar with television operations to the point where they (the consultants) can look ahead far enough to make the right recommendations. I've been to institutions which have had a system in mind to do a job, were all set to buy equipment. They had a specific job to do; any camera would do it. But it was expensive, not flexible enough, as I pointed out. How might they use this tomorrow? After more planning we wound up with all kinds of possibilities. The point being, you almost have to define your program and plan for the future before you determine equipment. Now, I can go one step further and say that too often equipment is misrepresented. I think it is important that we inform people who are going into this thing that they just can't refrain from hiring consultants when they might get the service free from a local representative of company X.

3 - 182 Yes, yes!

9 - 183 He isn't called a slaesman any more; he's called a sales engineer. Rather questionable.

12 - 184 Let me ask a question that's bothered me for some time. Why do many automatically assume, most of the time, that a less good picture in a classroom is more acceptable than it is, say in a home?

V - 185 We don't; it's a matter of definition. It shouldn't be different. I see no reason for schools to assume a vidicon camera is inferior. There's no reason for it to be.

12 - 186 Hasn't this come up by the budget boys? If it's not much good, why is it used for broadcast purposes?

3 - 187 I'll tell you what's happening right now throughout Wyoming, for one example. I don't know if there's one in Nebraska or not; there's another station in Montana that is now using vidicon equipment for broadcast purposes in areas where they do not have the competition of other stations.

5 - 188 That's the answer to your question, Dick, whether conscious or unconscious.

8 - 189 I know of no evidence to show that stations,(I'm talking about one that's well equipped - let's say with vidicons, a good engineering staff) putting out a good signal need to be concerned about what equipment is needed.

3 - 190 More time is involved, isn't it? - - - I would like to say to you then I have the same equipment that he has from the same company, the very same vintage; I even saw your pcitures from your studio lined up in the same way, the same number of chains. My man is brand new to us. He first came in at the break here when we had all this trouble - bad picture and everything. The man from the factory came out, spent three days there tuning them up. I'll tell you how qualified this man is and what he's done since. Every day, and there was not a day went by we didn't lose a camera, we didn't lose some points; we were replacing - - - things.

V - 191 How many cameras do you have?

3 - 192 Five - This is a good man. Twelve years at the last place, fifteen years chief engineering running TV, AM, FM, right in one building. Now we turn around and buy a set of I.O.'s. Now this is from the production department, not from the engineering department. This figure came. I asked just before I left, what would you say, what have we lost in cameras? Since December, 800 hours (operating time) we lost five minutes on both cameras, never losing a bit on the air due to this I.O. This is what I have to say.

12 - 193 Well, here we come to the specific statement again.

3 - 194 Yes.

12 - 195 This is the individual difference.

3 - 196 Who can say?

1 - 197 I've had the opportunity of operating the situation in which one half of the shared time operation used I.O. cameras, the other half of the operation used the very latest vidicon equipment. Now, there is a very remarkable difference in the picture on the air, but we've already said that this may be due to inadequate lighting, poor engineering personnel etc. But the one thing that I'm sure (you cannot get at this point anyway) with vidicon equipment you have limited flexibility in production.

12 - 198 True, you're right. (unanimously)

0 - 199 We recognize that I'm sure. Difficulty in dramatic production.

4 - 200 We have been able to do that; we've been able to get everything; but I want you to know we sweated! I'll say that we've gotten flexibility; but not easily. But it can be done.

9 - 201 Well, what we hear of the new 4 1/2" camera tube is that set up time on the camera is even less than on the 3".

7 - 202 It looks more like the vidicon, doesn't it?

9 - 203 The grey scale is closer to that of the vidicon. . . .

4 - 204 We brought one down to our plant with the TK-15 and TK-12 and our own camera.

0 - 205 Well, you see I'm gathering this information here because I can see the reasons for difference of opinion, but I think we are resolving our difference when we understand that there are treatments to be concerned here. Lighting for example, maintenance of equipment, personnel, use, and the elements that go along with that, and I think that the vidicon will stay in its position very well, perhaps not as flexible as the orthicon, picture-wise we're comparing difference in quality. I don't know if there's reason for throwing the vidicon out! I think it's just a different kind of picture.

3 - 206 However, is there anyone here who would not rather have an I.O. if he could have it?

7 - 207 It depends on the application.

3 - 208 No, I meant generally speaking.

7 - 209 I don't know if we can generalize that far.

1 - 210 Again you must specify what you're talking about. (Comments)

0 - 211 Now we're not doing some of the things many of the fellows are trying to do. We're not doing anything dramatically. We are not intending to that I know of. But the point is, that the job we are trying to do, we feel the vidicon does a real fine job; maintenance is low, the original cost is low, and we've got all these facilities and we think we can handle them. Whether to choose I.O. or vidicons depends on the program, very much.

10 - 212 Hasn't the vidicon made a lot of progress in the last five years? (Unanimously: Definitely)

0 - 213 Let's take a hard look. What do we lack in the way of facilities? You see, Carpenter said earlier, so nicely, that we so often have bought the equipment and then figured out how we are going to use it. Slowly, I think we are reaching a point where we're starting to plan ahead a little bit. We plan and then buy. Well, to my knowledge, we have no good communications between educators and design engineers as to what is needed in the way of new equipment; let's take a look to see if we can uncover anything that to us, as people in television, is needed in the way of additional equipment and facilities to do our job? Are there kinds of equipment needed to enable educators to do a better job via television?

2 - 214 I'd like to try to sum up what we've been saying, as a definite approach to a problem, assuming, let's say, some center wants to put in equipment. What would we recommend? I mean, you've got to write a book that goes out to a large number of people. As television facilities expand in the country you're going to have more and more of these people who are naively asking,"How do we get in the business; how do we proceed to select equipment; what kind of space do we need etc.?" I wonder if there is agreement on these parts? There has to be an analysis made of the needs and potential uses over time; that is, taking the more immediate uses that you can see and speculative ones later. This could be helped a great deal if we had some kind of standardized analysis sheets which could be given to people, because the individuals who are in the context are the ones who are going to do most of the defining what use it's going to be put to. I think then, we need to think of some kind of consultant teams. I don't think our equipment salesmen are adequate, although some of them are extremely helpful and you soon learn the ones you have to discount and those you can get some good from! I think that we need the "educator" point of view on the consultant team, but I think we need a kind of generalized highly ethical engineer who is looking at this thing as an installation and equipment. Now, there may be certain other

2 - 214 approaches to the problem of establishing a TV operation. These are just a few ideas that occur to me and it seems to me that if we could develop some people who could integrate their educational thinking with the engineering aspects and problems, this could be an extremely useful thing.

11 - 215 Going around the country do you think - has it ever occured to you - to try to put into two columns relative advantages of vidicon equipment as well as the advantages of orthicon equipment? I think that orthicon has advantages, and we've talked as if vidicon is just a cheap model of something we'd like to have, namely, I.O. I think that - possibly before this thing is buttoned up a little - a relatively simple little chart in addition to economy (is desirable). It seems to me that I've heard - - - (I may admit, some engineer can tell me I'm all wet) do you have this difficulty of burning on vidicons as you do on I.O.? There are then, if you're using certain types of sets and certain types of things, some pronounced advantages for vidicon cameras. The reconcilability - compatability, with video tape standards and things of this sort, that can be looked at in regard to vidicon and I.O. I do feel that some sort of a very simple little new division with a couple of columns that don't take pot shots at the other one, but each of which mentions some positive advantages of this kind of an operation would suggest to you, that is to a superintendent, an administrator or a station manager, which of these columns he needs most to fulfill. That would be very useful, because I think, frankly, there's been so much nonsense and propaganda and stuff kicked around on this whole camera business that the closer I get to it the more I think somebody better take the bull by the horns and face some facts.

2 - 216 I'd like to say this, thinking of the cost accounting, there are many situations on which there are certain limits, maintenance cost, antiquation rates (for instance) and things of that sort.

0 - 217 Now, just to carry this thought a bit further as I look about and visit and see other institutions, I invariably see pretty much commercial broadcast techniques moved over into educational applications. Now, I'd like any comments on that. Is this the only way we can do it? Is this the way to do it? I'm still fishing for - where do we go from here? Do we keep on doing what we're doing? Do we need a new kind of equipment or series of kinds of equipment? Are we meeting the job of the educator? Are we able to do what he wants us to do?

4 - 218 May I make a comment - - - this didn't come out and I thought it would, and that is, the neophites who are getting into this business who are looking for equipment, should recognize that one of the biggest fights that they may have with the powers that be who will buy equipment, may be less the difference between vidicon and I.O. and the full understanding of the difference between industrial vidicon and broadcast vidicon.

12 - 219 Or will they palm off pure industrial vidicon?

0 - 220 Well, what about this process? Are we happy with what we're doing in terms of production techniques, with the physical limitations?

11 - 221 Let me make a remark and I've been making it for several years, particularly - - - production workshops and things of that sort. I think that there is initially quite a difference between the production philosophy for approaching education as opposed to approaching commercial entertainment etc. in which a variety of shots, fixed shots, angles, camera movement and the rest of it, because I feel, and I have been begging people for years to get the guy clear on camera and hold him there because you've got a long point to drive home here fellows and if you keep cutting in and out, changing cameras, the first thing you know it has become not a continuous thought which you are driving home, but a television show and we're not in the business of producing television shows when we are doing that.

3 - 222 I'd like to back you up there. I couldn't agree with you more, Harry, but let's look one step further than that. There's one thing that you're talking about here that we must do, and that is, if there is an advantage that is available in the transmission, and especially, say in television, if there is this advantage here to do this type of thing which will support this point you're going to drive home, then it should be done. But you see in workshops, and I'm not taking pot shots at workshops, most of the time it is a learning situation where people are backing up and pulling out; they did not give the thought that's necessary for a run down production sheet to support this with the talent, knowing exactly - - - I can show you different cases where they sit and count and ready when he says the word it's on this to support him, not to exhibit number one. This is one thing I agree with you in fighting and especially in this telecast procedure, is not to exhibit a production program but to use the advantages of the medium to communicate the idea.

12 - 223 Well, the minute the technique shows, you're defeating your purpose.

3 - 224 Yes!

1 - 225 Gentlemen - Why is it different from commercial television or any other kind of television? Communications is communications. A classroom session or person to person relies as much on this point to point - person to person communication as a classroom lecturer does to 45 students.

4 - 226 This is a matter of maturity, beginning directly with a new man; now he's been on the show six months and is down to one camera and is doing a good job, wanting more fluid movement of the one camera rather than taking the cut.

11 - 227 I've been conditioned having been in control rooms on some professional net-work shows where there is no reason in God's green earth to change cameras - - - to zoom in or come out and it becomes a part of this veneer that is known as commercial technique and it is that which too many of our people - - - imitate. If they were to imitate the producers of Person to Person or something of this sort, (unanimous approval).

4 - 228 We did a study on John Frankenhiemer, checking his work from beginning to what he's doing now. What a perfect example of what you just said.

0 - 229 Now, let's twist this same idea one step further. This guy who is directing the show, who is he? Is he an educator, is he a communications specialist, does he need to know the subject, or what are you looking for in this person? (Everyone goes begging)

11 - 230 He's a communicator.

0 - 231 He doesn't need to know education?

12 - 232 Yes, and more.

11 - 233 He may need to know specifics. That's right.

9 - 234 I wonder if it's certain types of materials he may need to know. For example, he may either need to know or how to find out, or better have somebody there who does know it. (Quite unanimous: Right!)

12 - 235 This is the value of having again an adequate personnel, but I think we're talking about a director. You have points of reference within a director's staff, where you can turn to. This guy knows a little bit more about medicine, this guy knows a little bit more about science and this guy knows a little bit more about language-arts etc. down the line. But, I don't think they have to be proficient (in everything). I don't think they have to be authorities. In fact, I would prefer not to have an authority.

9 - 236 And any one of them, at least theoretically, could move over to language arts and do a pretty good job because he's interested in how you communicate a point, and he's been trained to think in terms of whether this is getting across, not necessarily, - - - it's sort of like the wonderful illustration that the army has, of this whole teaching business, where they took the completely uninstructed instructors and gave them the teleprompter script for the electricty course and had them teach the course. The instructor couldn't pass the final examination, but the people who had taken the course from the television set could. This is what we're looking for in our communicator. - - -

9 - 237 They don't necessarily have to wind up as authorities.

12 - 238 What's the director supposed to be thinking about when he's sitting in the director's chair anyway?

1 - 239 Well, it's conceivable that a director should be many things and he should have many characteristics, but probably there are some characteristics that should be more important than others. Maybe the best we can do is, first - say he should be a communicator, and second - he should be an educator and third he should be this and so on.

0 - 240 Probably some place along the line here - - - I hope first, he knows how to use equipment! (Much discussion - many voices)

3 - 241 I'll modify John's statement to this, that he understand the limitations of his equipment.

9 - 242 As a communicator that's part of his work.

3 - 243 For instance - you take an I.O. or you'll find yourself in a situation where you'll have the vidicon. Then, I think the individual should know enough about this - - - these two things - - - the advantages and disadvantages of both that he could do, these things which you are talking about, know the limitations of his production.

0 - 244 Now, let's take another look at this. What does he have at his disposal? He's directing this educational process, he has a switcher. He's the "jack" of many trades: what does he need in studio facilities? Does he need view-finder cameras? Does he need zoom lenses, does he need movable cameras etc.?

5 -245 What is the objective he is trying to reach? - - - then we come back to the thing Pat was trying to delve into. There is such a variety of uses to which educational television can be put that we've got to think in terms of the objective.

9 - 246 However, within the normal context you will agree, it's highly desirable to have view-finders, not have random sync cameras. There are exceptional cases where random sync cameras would be perfectly all right if you're just going to have them observing classrooms in operation, a whole flock of cameras pointed in different directions; you don't have to have any controls over them at all. Nobody's got to aim them or move them or change lenses or do anything with them. This is a usage, conceivably, you can have for this type of equipment, but I think there is a point below which studio production, for virtually any purpose we can think of, can't go with equipment and still do any kind of a job.

4 - 247 Are you talking about the producer, the technician, or the director as a producer, or are you talking about the director as an educator? What are we getting at? What's the definition?

0 - 248 We've established the fact that a person who is serving as director must know the potential of the equipment. I'm trying to figure out what equipment he needs to do his job. There are limitations; you might want to do an observation, direct teaching, or a broadcast. I don't believe there are any more types of operations that can't fit in one of these. I think they are general, maybe you can dream up situations which won't fit in those three categories - - - granted there is a certain application with one camera observing the classroom situation or the teacher; I guess this is basically educational television or instructional television, but we have said we are utilizing a person as a director, therefore, we must have some physical plant for him to work with. Now what is this physical plant? We have two cameras. Well, must he have directive cameras, movable cameras with dollies or tied to the wall? Maybe you can say there are certain situations where you can do certain things with a mounted camera. We must be able to back up our convictions when we talk to people new in TV. Help them to plan ahead, discourage the simple system whereby they will "box" themselves in! We already said they are interested in developing TV, many I've talked to new in television say, "I want to get into this thing, and I want it to start slowly and develop." Let's start him off on the right foot.

V - 249 Yes!

9 - 250 Where do you place this L. A. City College situation? That fellow doesn't want to develop - - -. I think you're making the right statement there because we get off on the wrong foot when we say for that kind of job that's all you need, but then the first thing you know they're in trouble. Why are they in trouble? Because they had not started out with the basic minimum.

12 - 251 (We have juggled for that in one of the schools which turned to TV for teacher training and observation.) Now with the equipment they have for observation, they are trying to develop into - - -

9 - 252 That's why I say I think we can move slower. I think we can say that anybody who is going into educational television, unless he is simply going to agree to restrict himself to observation, does not want industrial vidicon cameras. That's rule number one.

8 - 253 I don't know that everyone in N. Y. would agree with you.

0 - 254 We have a public realtions problem too. We're hedging on a number of things.

8 - 255 Based on the experience of the (Chelsea) project (If any of you were to see the product and were to say this is sub-standard, Warren has seen it - maybe he agrees, maybe one of you will disagree), I don't know of any evidence where it's interfered with educational process - - - one jot!

10 - 256 I doubt that it did.

8 - 257 I doubt that it has too, but we have no documented study. I trust to prove this, by my own reaction after watching it a year, that it hasn't interfered with the educational process one iota.
Many voices (amazement)!

8 - 258 Now mind you, this is coming from a guy whose spent six or seven years with I.O.'s and I was flabbergasted!
More discussion, many voices.

11 - 259 I will compromise - - - and I've seen some industrial stuff.

8 - 260 Now mind you, I'm not recommending this as a way to get up - - - I'm just saying this project has been going for three years with this set up - - -

9 - 261 Now we're back to the end product.

11 - 262 I'm willing to compromise on the kind of cameras, for example, I.O. vs. vidicons; on the other hand, now you've got more production that has to be done in educational TV whether in the classrooom, that should be able to be done, or on a local commercial station. They never do this much; so I think from that point on we'd better have good cameras with view finders, good dollies - dollies that work, I don't care what they are. That's where I want the flexibility - the good equipment.

0 - 263 Let me add this statement; let them proceed any way they wish, just so that, if they desire, they can expand this thing without becoming completely obsolescent. There's the crux of the whole thing.

6 - 264 Let me say this: Your director has a big job to do. He can either make or break a program, so let's not put any stumbling blocks in his way. Let's give him the best we have to offer so he can do the best job.

12 - 265 But not on his complete say so. Here is where the consultant and the engineer comes into the thing.

V - 266 Sure, sure!

12 - 267 So you give in to a director and he wants a lot of fancy electronic gadgets. Effects amplifier and all that stuff. This doesn't help your educational TV program one bit. We're back now to effect for effect's sake. There are also very legitimate applications for effect's sake.

BREAK

0 - 268 Gentlemen we are back in session. I'd like to start this off thinking in terms of what we're trying to accomplish. It seems to me that we are, in a sense, architects of tomorrow's educational television systems. With

0 - 268 that idea in mind let's continue. Skornia would like to make a statement.

II - 269 Warren Seibert and I were talking and I used an analogy that I used to use with students, when I was teaching. All of us sitting around here, maybe the somebody that has 20-20 vision, maybe there are people who run all the way from there to all degrees of less perfect vision. Now, our hearing varies greatly. Somebody may be able to go up 20,000 cycles or 15,000 if we're still lucky, or 12,000 at our age etc., and all the additional frequency response you put in there is not going to do a lot of people any good. Well, with my far less good vision than a lot of you, I may do some stupid thing, but I probably don't do too many more stupid things than people with 20-20 vision, but I learn almost as much looking at the world thru these blood-shot eyes with glasses and things like that. We could even talk about, I know, the reduction of efficiency. I saw it in some sufficiency here, when your glasses are dirty as compared to when your glasses are clean and all the rest of these things. Well, I think that in our discussion of industrial vidicons and vidicons versus I.O.'s we're carrying some of these things too far because the kids in the class also have varying degrees of vision. Once you're over the hurdle and the signal is comprehensible and your equipment is designed with flexibility and open-endedness in mind, then there begins to be things that are a lot more important than whether you've got a vidicon or an I.O. or something else. Because you've got that same difference whether a person can learn if he's half blind or all blind; half deaf or all deaf or the rest of them. And I do think that we've had, in the early stages, an inclination to let technicians over-emphasize the differences which these degrees of perfection make.

4 - 270 In other words - - - to the end - instead of worrying about the means.

II - 271 Yes, I agree with putting floors under here, but I think that intelligibility, clarity etc. are important. Let's not over define some of these.

7 - 272 But, Harry, you are already dealing with a limited system as soon as you move into a television system of any description. You have a ceiling as well as a floor; and obviously there's, I think, no real problem in floating as high a ceiling as you can but the bottom end is quite a more difficult thing to determine.

II - 273 Some of the most complicated processes in steel making, where you have pretty close tolerences to examine, industrial vidicon cameras are still giving very accurate examination and darn good definition.

3 - 274 You're 100% right, Harry, but what do they use, about 1,000 watt lamps to get beautiful pictures?

11 - 275 So there are uses for all these things.

V - 276 Right! OK!

9 - 277 If we're going to talk about future equipment that means anything in terms of cameras. Then what we really need to say is that somebody's got to come up with a camera and lighting that will give you all the flexibility and utility of I.O. cameras, all the maintenance - free characteristics of vidicon cameras, tube life, etc., and this is a combination of electronic and non-electronic gear we're looking for.

7 - 278 We're also looking for what's easy to operate - preferably automatically, an automatic device.

9 - 279 Although there have been a lot of remotely controlled camera systems developed, Kay Labs. has had them.

7 - 280 They've all had their defects.

9 - 281 They've all had defects.

12 - 282 John, it seems to me if you were interested in getting out some kind of a formula that could be of help to people who are going into this thing, that someplace in the formula would be the question put to such a person. "How do you plan to use it, not only now, but what do you see happening three or five to eight years from now?" Once you get the answer to that, it would seem to me, then that you can give some kind of an evaluation of the types of equipment that we've been wrestling around here a little bit; the I.O. as opposed to the vidicon and then this is accompanied by certain conditions also. If you have these things present, this kind of equipment, let's say vidicons, will work very well. If you have other conditions prevailing the I.O., I don't think you are going to come out with a situation that is going to mean all things to all people. I don't think you can do it. But I do think the task is getting so hard to be set down here that we tend to get kind of obnoxious. It's this question of purpose. What are you using it for, why are you going to put up a TV station? What are you going to spend 50 - 100 thousand dollars or more - - - ? Why do you want to do it?

7 - 283 Why do you look through a microscope?

12 - 284 How many people here have changed equipment since they started operation? Any kind of people - - - from the time they've taught their first class.

0 - 285 Yes, we have - - -

12 - 286 How many people have gone into it? I'm just simply raising this as the devil's advocate. When you go in and you give the grandiose plan, you're buying your model T Ford right now and you are stuck with it the rest of your life! The chances may be at the moment you buy you think they're going to be; but you get for your purposes here, in terms of what people around you can see is expedient, what you think you should have. I do believe you hurt yourself by going in and saying, yes, this is where we are going to start now. It's only about so big, but if you wait about 10 years from now and boy, we're going to be big! These same people are saying, I'm not sure you want to grow that big etc., but we will give you what you need at this time. Now as you expand and you get a second studio for instance, or you take on another aspect of this total pie, another part of it. You can, in time, justify getting the equipment you need at that time. I'm only trying to say that it seems to me that we can run into a lot of trouble by trying to see this thing too big at any given time.

3 - 287 We've all had limited financing to start.

4 - 288 I've got vidicons and they are working, but I wouldn't say for one minute that I don't want I.O.'s. I'm looking forward to the day when I can justify them, and I'm sure that I can. My problem right now is, if I may speak personally, making these vidicons do everything I can possibly make them do, with the best possible picture, but I want to move on to I.O.'s.

9 - 289 We have I.O.'s; we want to move on to the 4 1/2" I.O.

5 - 290 That's always the case - always something better.

4 - 291 May I point out to you to say the job, as we see it now, is perhaps to leave some doors open instead of taking the total picture a person should take into the legislature - - - and never get approved.

12 - 292 At the break Warren introduced another theme (advice to educators) that has, in part, some of the ingredients of this thing, and that's when you talk to them, you must say, how much money do you have? This controls a heck of a lot. If you are going to plan a $500,000 installation and maybe - - - $75,000 is available to work with, you're going to kiss them off right away.

7 - 293 Yes, that's right.

2 - 294 I think this is the place for me to make a point too, to kind of tune us to another angle. We've been talking about getting appropriate equipment and I'd like to make the point - not excessive equipment. It's just as important not to over buy and over-load yourself with equipment as it is not to have adequate equipment.

4 - 295 It sours the administration, sours the legislature etc.

2 - 296 This thing is almost a Parkinson's Law. We started simply, but by golly we can't stay simple! One of the main factors in here is the engineering thought. There's a new type of testing equipment that he thinks will give him a little bit more fine discrimination he (the engineer) wants and raises cain until he gets it and is therefore the progressive complication of even simple equipment, and the person that is having to take the responsibility for the operation is frequently unable to judge the validity of the request for more and more equipment that's more and more expensive and more and more complicated.

V - 297 Agreement of opinion stated.

2 - 298 How do you control that? This is another kind of ceiling you were talking about. How do you control this kind of ceiling as well as this kind of floor?

4 - 299 Maybe, on the other hand, we could get to this myth of the expense of TV.

V - 300 What do you mean by myth?

4 - 301 Well, sure, it is expensive for the job it does, but let's compare it to schools, to programs that are just as expensive. My gosh, the biggest TV installation you can think of as against an atomic reactor, or the amount of equipment that goes into a really good physics program!

V - 302 Agreement.

4 - 303 And yet it came along in 1948 and 1949, the thought of these big NBC-CBS studios; then there's this image - it's kept going; that TV is just an expensive thing that's going to eat up $500,000 a year. I'll wager that in our TV operation we're not spending one quarter of what they are spending over in some other department. I guess this is what I mean by myth!

C - 304 I'm not raising questions for which I think we have some answers, but you fellows are in a little different seat from me. You have angles to these things that I think we must consider. I'm trying to wed, as it were, the engineering problems with the other problems of the TV operation to find out what engineering is not doing, what it should be doing and what our common beliefs and philosophies are. I'm on the receiving end too. I don't want you to think that as long as I don't ask questions that you are to stop talking. I do want to hear something new. I am looking for new ideas, adventurous philosophical approaches to the charge of engineering. What we are not doing? What should we be doing. Now we've pretty well taken care of page nine.

6 - 305 Just one more thing. I don't know if this is the time to bring it up or not, but we haven't said a thing about color.

9 - 306 We have never gotten to the point. I mentioned it once and I think that was the last time it was ever discussed, but I would want to know (we were discussing it at lunch) projection equipment. I pitched in to a big hurrah at my institution because we're about to build a building that's going to be part of a four and one half million dollar library. They want to build a little auditoirum which is supposed to be the cine center (for the audio-visual aid group). They got their consulting archietects, got involved with a company which sold them a great bill of goods which, as near as I can make out, is made up of five separate projection systems. We were called in after this was all done.

V - 307 Naturally. Often the case.

9 - 308 We were asked what we thought of it and we spent about two days studying it and came up with the thought the whole thing might be nonsense. That put us into a terrific donneybrook with the architects, of course; the talk went on for two days. We received some very unsightly correspondence. But, actually, as far as we could find out, we wouldn't find any adequate projection system that would do the job that they envisioned. Now, Ray tells me of the Eidophor system on which I have a figure, a letter from Teleprompter, and there may be other developments which we never found out about. I would like to know what the future of projection equipment is, if anybody knows.

4 - 309 I figure Ray Carpenter has some information on this. I was very pleased by the statement he made on this at lunch. If you'll allow me to quote him (or paraphrase him at any rate), he said he was more interested in the equipment that hadn't been built rather than what's in and working.

9 - 310 I'm giving this simply as an illustration. I've listed one and I'm sure there are additional ones.

2 - 311 Well, Eidophor is a very complicated development which will probably be shaken down in a few years. Right now, it's at the stage where it ought to be tested and we're working out an arrangement for them to install one in the auditorium and test it. I do feel that we're perhaps being a little too satisfied with the reception end, and recognize something that Harry mentioned before as we picked up these receivers which came off the assembly line and poured them into classrooms. In this connection, while I remember it, if you haven't seen the book (EFL Production) of Chapman Industrial Designers of Chicago, you ought to look over one because here is how a first rate staff of brains - - - speculated about how you can fit television in with this, not a single large screen projection arrangement shown in that book. They discussed it and

2 - 311 eliminated it because of the required precision and inadequacy of this type equipment.

V - 312 Comments on "Design of TV Schools of Tomorrow", EFL booklet (complimentary remarks). I think the Eidophor exemplifies again the type of equipment that should not be recommended until it's very carefully checked out thoroughly; engineering requirements, maintenance requirements, and in the field of operations.

II - 313 That's it!

2 - 314 This Eidophor projector has practically every engineering system in the book, a complex optical system, chemical engineering system because it reflects the image on a rare oil that's on a parabolic reflector which is constantly smoothed by a mechanical system under vacuum, requires very high power etc., and has absolutely perfect resolution and throws a picture 24 feet by 30 feet; if you want one that large.

3 - 315 It is my thought that GE has this in Schenectady and your GE man should know about it.

V - 316 Thermoplastics?

3 - 317 No, this is none of the thermoplastic developments - this Eidophor system has very high resolution etc., but it is out of my range. Much, much, too much - $50,000 dollars!

2 - 318 Now, on new equipment, I'm thinking day and night about our own system and I will start with this basic principle which might give you some guidance in some other things. The general strategy in approach and plan is for the purpose of increasing the intensities and extending the inner-action of learners with the learning material. Now, equipment can interfere with that; accept that as the general principle. Equipment can interfere with it or it can work in a positive direction all the way along the line. Now, I think that here is the place, particularly in closed circuit systems, that I believe we've got to push this, in broadcast too. We've simply got to develop equipment systems that are feasible for more activly engaging students in TV classrooms. Testing, getting responses etc. and it has taken us about five years to get a satisfactory talk-back system. I think that this is in the primitive stage of engineering. Here's the place where we desperately need good engineers to turn their attention to the question of how you get reactions and response on the part of students.

3 - 319 This is to talk to your point: for argumentation, debate and discussion. We have been discussing this privately. One of your men came through with this very thing, Detroit did this, and some private tests have been carried on. What is this response? I've forgotten the man. He stopped

3 - 319 at my place and we were discussing this. He's one of your math teachers; anyway in talking to him it was found that in several experiments which are available, that 90% of the questions asked were such that they did not add anything to the content.

2 - 320 That's exactly right, but not the kind of responses we've been talking about.

5 - 321 I think the experimentation you're referring to, Claude, took place at Lowery Field - - - where they claim to have found 80% of the questions asked were anticipatory, 20% were irrelevant, and 10% were relevant.

V - 322 That's 110%.

5 - 323 All right, back it off whatever it is. The report is available. So what they've done, for the first time though, is to encourage questions to be asked; the interpretation of questions, and when you - - -

V - 324 Evidence of doubt of value of present concepts of two way talk.

2 - 325 All of the questioning doesn't give you a significant difference from a classroom which has none of the questioning. Now, this, however, is in terms of a class that's primitive too, because of the equipment.

5 - 326 It's a very specialized type of class, plus a very specialized type of instruction.

11 - 327 John, at this point we've got to bring up this Phonoscope thing because it ties in so well with the experiment in Galveston. I'm not going to take the time to explain it. Very briefly, though, I was reminded of it by turning to equipment and environmental conditions and some of the other things that we haven't covered here. I see - - - if you get equipment that is too cheap, or you get equipment in which talk-back and all these other things are so easy, the first thing you know, you have taken away all the advantages of selectivity and pressure and better production standards which television is beginning to introduce into education. I feel that this can, so quickly, lower the level in education practices. Just having bull sessions, or having the same inefficient teaching and very efficiently conveying the irrelevant questions and all the rest, here is a point that I think we have to look at it as a danger; to keep equipment which reinforces - - - you call it television, you say you've got it, and yet what it does is nail down the old practices and build a wall against the kinds of changes that real television practices can bring.

5 - 328 Here we're talking in terms of future equipment trying to plot out the minimum requirements and the like, yet we're thinking in terms of approaches that are in use today. Maybe that's a mistake. To what extent

5 - 328 is the individual learning machine going to alter closed-circuit television?

1 - 329 That was my question. Very good.

10 - 330 You want to know a little piece of information there? Title VII programs had hardly heard of teaching machines so far as a proposal was concerned until this past - - - deadline, and I wouldn't go on record as saying what the percentage of proposals was that had to do with teaching machines, but it was a very significant percentage in this last batch. Prior to that I suspect that we had 15 in the file of 420 or so proposals which would have been about right. Maybe 20 out of 420, but a very small number. We got that many again plus, I don't know how many more just in one group of 170 proposals. If you don't think the field is red hot now, you just come and look at the number of them, we could tally them up - - -.

4 - 331 Just as faculties have been somewhat sympathetic about television, they are just that much sympathetic toward teaching machines.

11 - 332 That depends upon the faculties.

10 - 333 Faculties are not necessarily very sympathetic toward them yet, anymore than they were toward television in the early days.

4 - 334 At least they don't consider it a threat to their control as such.

10 - 335 Yes, scratch out early days - - -

1 - 336 I'd like to emphasize the validity of Jack's inquiry here. Actually, as I've hear in the past few days from the leading educators around the U. S. talking about something that's actually obsolete, the new developments in the learning machine are becoming just fantastic.

2 - 337 I think we've got to do some adapting and I suggest one other place where we need equipment. I'm again looking at the university, that's where I live, and the university is divided into two halves. One, a very extensive academic building system, and two, a very extensive dormitory system. Now, here we've got an instrument which, with some engineering development, would make it possible to extend instruction and diffuse it through the camera (to a point of saturation), but we've got problems of cabling, which can be licked, and I think we have the other problem of getting a proper receiver where it belongs, at minimum cost. For example, I am thinking of the possibility of getting most of the guts of TV receivers in sections of dormitories, and essentially having almost a flat tube in dormitory rooms. Then we come to one of the other principles, consumers of faculty time and energy and that is the reiteration and repetition of instruction. It goes on over and over again. For example, we employ six chemistry instructors to teach our first year chemistry. They repeat

2 - 337 almost the same stuff with variations in style, depending on the instructor, 13 times per week and there are two of these.

9 - 338 Tape is the answer to that.

2 - 339 Right! How do we work it out feasibly, how do we make it feasible to reiterate and repeat what needs to be reiterated and repeated in the curriculum?

10 - 340 Is it better for the tape to be fed to a large group or is it better for the tape to be fed to the individual who can back track and repeat something that is on tape?

9 - 341 Well, I don't think there is any doubt that you can rig it in such a way that he can look at it on his own, at his own leisure and make him responsible for it without any attendance being kept, that would make a terrific stride, but I think we're a long way from that. This relates something to what Ray was saying earlier that it does for the problem of repetition because the repetition problem is solved. We play the chemistry tape eleven times a week, that takes care of 1800 students. One guy does it once. We do the same thing in psychology and German. But this would be the ideal approach. We've tried to meet that by playing the things back a couple of times at hours at which they weren't actually scheduled, but were scheduled for review so that the students who needed it could come back. And one thing we found this does, it removes all the excuses. The fellow can no longer say, "I don't get that," because he knows the instructor is going to say, "Well, why didn't you come to the review section?" And nobody had to teach the review section, it just ran. Somebody just punched the button. I do think there's an equipment problem there, if we could separate the guts of the video tape recorder from the heads, we could run six or eight heads and run six or eight tapes with one $50,000 machine it would be a very big help. I do think we're - - - logistics and economics aren't in our favor.

V - 342 Favorable reaction.

I - 343 Ray, how many channels can you use at one time?

2 - 344 We're starting on this systematic table and we'll have the same thing as they have here (in Hagerstown). We can put on seven, I think.

V - 345 Discussion of tape - etc.

2 - 346 Gentlemen there's another problem I'd like to throw to you and that is the new equipment. Essentially a lot of learning is progressive condensation of information that's spread out to begin with but it is progressively condensed.

2 - 346 What we need here is a video abstracter, so when you start repeating this not just to present to students once, but perhaps it requires three repetitions of certain selected difficult, critical sections of the lesson. Now, how do you get the audio and video condensed so that what is needed for repetition in an hour's lecture demonstration can be presented in fifteen minutes? Even with multiple cameras you run into the problem of time because, from the point of view of the student he can't spend an equal amount of time reviewing tape, so if somebody can come up with a feasible procedure, production-wise and otherwise, equipment for video - audio condensation or abstraction.

9 - 347 Antecedent problem - How to decide what needs to be abstracted?

4 - 348 On the basis of teaching machines that we have now, and I have a very little knowledge of what's available, how can we use it? Is there a "for instance" or something we know is here now? In television, can someone come up with an example?

V - 349 They're so new that I don't think there's much to comment on.

0 - 350 I would like to make this comment. We're not going to run this thing all the way down the mill and come out with all the answers, but when you leave, you'll have a copy of these topics to take with you. I'm sure there'll be things that will come to your mind after you leave here. You'll have a chance to comment on them and return your ideas. I'd like to point out, in regard to this video tape condensor, (of the kind that Ray refers to), we had, at the University of Illinois some years ago, an audio compressor of which some of you may have heard. Dr. Fairbanks and Dean Everitt of Illinois perfected this speech compressor which would permit you to take a fifteen minute audio recording and play it back in five minutes without editing the tape. I can't explain how it works.

V - 351 What?

0 - 352 The tape didn't change pitch or anything; they learned some peculiar things which I think TV has been proving - the mind works faster than words can be spoken. We take advantage of such things. What Ray points out, I think, is a technical possibility. You have another opportunity after you leave here to react to some of these ideas, perhaps other things too.

5 - 353 Yes, without trying to stifle the conversation on this particular point, I'd like to get back to what is really the basic consideration of everything contained on page nine. At least it's [illegible] a specific - - and by looking at this specific, we may be able to attack the problem slightly differently. This is not an academic [illegible]

5 - 353 discussion at all, as far as I'm concerned. I'm shortly beginning a consultant assignment for the University of Maine, the State Department and all the educational interests within the state, an assignment that most likely will lead to the activation of at least one of the VHF stations and conceivably others, interconnected, and also joining the New Hampshire and Boston ETV stations, too, - - enlarging the ETV network up there. We have hired engineering consultants Jansky and Bailey of Washington, who have done a good deal of consulting along these lines with educational institutions. One of the first questions asked when they met with us at Orono was this, and I think it's quite pertinent to what we're trying to do here, since we have to compile and present a report to the university and the state, for submission to the legislature next January. We have to compile a complete report including a technical as well as a cost summary. Now, at what level should we design this equipment? What is minimum equipment for a station or a four station network?

3 - 354 I've got the same problem.

5 - 355 What's the maximum? Talking about what Ray was saying, you can over-equip. What's the minimum? What's moderate? What's normal? What's average?

3 - 356 It comes right back to this question he asked. I know mine, I'm doing the same thing you are. We're setting up a corporation. It's in the process right now. We're looking at over 21,000 square miles. It's the same thing you are doing in Texas. We already contacted Bob about what they are doing in Texas and we're doing the very same thing you are doing in Maine. We're going all the way I.O. and we're bringing all the institutions in and the first money we spend is to lay out a plan (Adler's system). Number one, how can we cover the state best from our point of view with translaters from our section? We have advantage over most of you in that we can reach 100-200 miles now from one transmitter. Then, two, picking this up and doing it to the southern part of the state, two hundred and some miles away. What are they going to do at the university that far away? We don't have the money and it's not going to be available to put in another broadcast station on all of the other channels there. They can't buy enough I.O. equipment at four or five different places immediately. Plans are being made that they use what we are sending on closed circuit equipment, if they wish. The equipment will so be designed, that looking into the future, maybe 4 1/2 inch I.O.'s will be recommended. This is the plan, what else is there to do ?

V - 357 Discussion.
We've got a problem now, wait till we get into that - - -

II - 358 In a case like this when you are a consultant, as you know, you've got to be sure that they don't come back to you in two or three years and say that you recommended too cheap a level of equipment. You've got to live with the prejudices of the engineer you hire, and all the rest of these people. You've got to play it awfully safe.

V - 359 Much controversy.

12 - 360 Did you say there were four outlets or possibilities of four? Do they all have to be done at the same time?

5 - 361 They undoubtedly won't be activated at the same time. I will suggest a development package for the legislature. They may buy whatever they wish at the outset; then try to develop it accordingly.

II - 362 Will bids be made on specifications?

5 - 363 Definitely.

0 - 364 We are all thinking the same way and we all come out with ideas we probably had before we started here. There has been no problem pointed up yet which can't be done, provided, what we have now available is the kind of gear that will do the job the educator wants done. We are limiting our thinking to what we have today; let's project to tomorrow! What we did today is unimportant, we're trying to get one step above this. We have defined many problems, some can be resolved very definitely with present equipment design. If we project the planning we can find the need for new developments in equipment. Most planning is now based on known values - experiences of the past. The problem of finances, how do educators solve their financial problems? Repeatedly, most operations are staked on some form of gifts or grants. What are the answers to these financial problems? I would like to move to this problem. Does anyone have any idea as to how to put this television thing across on a basis of financial capability?

2 - 365 I've two bits of information from the Iowa State Teachers College and at the Penn State area. We looked over our situation and got around the critical point of how do you finance this. How much money are we going to need for cameras, this, that and the other thing? My reply, nothing! Build it into your regular operation budget. Television is equipment and instructional material. Get this much of it under that heading. - - - television, remodeling men, building modifications, personnel, teachers aids etc., put it there. If you need people of various kinds, put it under personnel, call them teachers, teacher's assistants, deans or whatever you want to. Let it go through the regular budget without pulling it out and submitting separate budgets for TV. The same thing will work in the New England states.

V - 366 Approval.

2 - 367 Right! Now there was a legal case in Illinois. You know it better than I; this was a test case. The things I remember about the action was that the University of Illinois specified how it is to do its educational job. This is the responsibility of the educator; and if he wants to use more teachers, that's his responsibility. If he uses facilities in effective ways and justifies them, then this is proper. I think we made a big mistake when we went out (either institutionally or on a state-wide basis or otherwise) for special grants, for special funds for television. We've got to move it into the "main tent." This is the recommendation that's going around at Pennsylvania.

4 - 368 Therefore, basically it's the school's responsibility and the legislature of that state, is that right? The government of that state - - - is responsible to its institutions.

V - 369 Discussion and approval. But it won't work on all open circuit operations, community etc. The test of their ability to use the state funds for broadcast and television however, does not do what Ray was proposing - that you bring it into the "main tent" by making it part of the instruction services because even in state universities, with very well established extension programs, this would almost inevitably be considered an extension. An extension isn't even in the "main tent" in most places, in fact, in some states it's just been moved out of the "main tent" and made absolutely self supporting. Where, in prior years, the state has been picking up a big part of the check, it's now said to the extensions divisions, "You've got to pay for yourself completely." So, the point Carl is making about broadcast television being a little hard to subsume under this "main tent" heading is true.

5 - 370 We're talking about two different things now. We're talking about instructional television versus the broadcast service.

V - 371 Discussion.
The instructional TV as closed circuit, that's what I'm referring to.
Yes, that could be - - - within the institution itself.

12 - 372 I think whether we like it or not, we're looking at some kind of an amalgamation of an agency to handle this to be made up possibly with federal government, state government, philanthropies, commercial broadcasters etc.

1 - 373 If you're talking about Federal supports, no!

V - 374 More comments.

5 - 375 We are saying it has to be done with tax dollars with many different approaches to finding and using the tax dollars! If the educational institution, by itself, isn't large enough to support this, what does it do? It combines with several other institutions and forms what we are beginning to see develop over the country, these educational television broadcasting councils. Individual institutions and systems not large enough individually to support the cost of television instruction collectively provide it through proportionate assessment of all members.

4 - 376 Perhaps this is inapplicable, but it's something I've thought about and haven't done anything further with it; maybe we shouldn't go into it further. It seems to me that if you are going to have an educational television network, and I'm sure if one were set up it will grow, that if we're going to be doing the kind of thing that the networks complain that they are being asked to do too much of, namely public service broadcasting, couldn't there be some arrangement whereby the networks might be obligated with having to do as much public service as they are giving time to commercial time as long as they would perhaps make equal time available in educational areas?

V - 377 Apparent dissention - already being proposed with questionable validity of practice. You can take 1% of commercial revenue of all the commercial television and give it to the educational TV stations.

4 - 378 I know this is old hat, but I'm trying to ask, is there any possibility toward this becoming more than just advisable?

V - 379 Many criticisms.

9 - 380 Now, wait a minute! I want to get one thing straight. I just want one thing to be real clear. The problem is that the House Rules Committee is on the Republican side (Illinois and places like that and Virginia). There is one though, Howard Smith who didn't vote, and there's one southern Democrat of those five, Mississippi, who is more conservative than Barry Goldwater.

3 - 381 Say, I might comment here that I can see why California says, "Come to California, keep California green, bring money!"

12 - 382 This cuts down the salesmanship that you have to do. We had in one of our neighboring school systems, a resistance to taking part in our program in any kind at all, for a period of at least three years and pretty soon the parents of the community finally got to the authorities of the school system and said, "How come? Denver did this, Aurora did this, St. Louis does this, etc., etc., how come we're not in on this thing?" We never had to say a word, because eventually the superintendent of the school district came and said, "How do I get into this thing?"

3 - 383 That's just fine - - -. Right - - -

12 - 384 - - - these various legislative bodies don't want to feel they are being done out of something.

3-385 Are you union, John?

0 - 386 Does anybody want to put in a comment on labor problems before we adjourn? I move we adjourn. (Hagerstown TV is not union)

WEDNESDAY EVENING SESSION

0 - 387 Have you a comment on architectural considerations, Fred?

7 - 388 Well, I think from some comments that you made when talking about the architects, that it might be desirable, in the final report, to caution everyone that the architects can be quite a stumbling block to planning a new facility and frequently even in converting an older facility. For some reason this profession seems to assume that Architectural Forum and a few other periodicals reflect creative thinking in almost any kind of building design. I know on our campus it was quite a hastle in the case of one building converted to a TV studio. I think everyone should be aware of what the dangers are; if at all possible, it is better to get a television consultant and not an architect. Also the mechanical engineers are a pain in the neck because of Item D here, the required environmental conditions, the air conditioning problem.

12 - 389 What did you have in mind by the required environmental conditions?

0 - 390 This has to do with the psychological effects of the studio and classroom receiving areas. I believe the program is, in a sense, reflecting the atmosphere in which we are working. We feel it here. If you have a dirty, old, run down, miserable, hay-wire studio area, the teachers feelings, reactions, are similar. In the classroom you must have good receiving conditions. You need good light conditions, good temperature control, good atmosphere and a wholesome psychological setting in this whole thing - both transmitting and receiving. This is basically what I am thinking about. What are the elements which concern or involve the learning situation?

4 - 391 At the risk of controversy, what would you people say is the minimum size for three camera lash up? I know you are going to say immediately, "Well, what are the conditions?" Let's say one of a certain amount of versatility.

V - 392 Are you talking studio only or studio and control rooms?

4 - 393 No! No! Just studio.

V - 394 We have actually a 40' X 60' studio and could stand about 10' on each side; or as much as 75' X 75'.

V - 395 If you have three cameras in 40' X 60' - is this the only sutdio you have or do you plan others besides?

4 - 396 No, we have other studios. But I was able to settle for 40' X 60' which is the maximum they would give me and the minimum I would accept.

12 - 397 I'm interested in this Item D because we have been, I think unconsciously, but nevertheless doing it, directing our thinking primarily to two kinds of programs. One kind of program is concerned particularly with instant telecasting. Another, which is concerned with in-school telecasting, as we think of it in terms of the college and university level. We have said very little, in this meeting here, unless I've been asleep, and that's possible too (I had a three hour sleep last night); we have said very little with what some of us deal, in terms of the adult education aspect - the broad general adult education aspects of television and adult education. When you get into this then, this studio thing and the environment of television and television production takes on an entirely different cloak. Some of you may not be concerned with this right now, but some of us are very definitely. I'm thinking particularly of those stations, and there are several that are of school licenses such as Denver, Atlanta and Des Moines. I am thinking of those stations that are community licensed, such as St. Louis, Cincinnati and others. They have this problem, this broad area of community education, and when you get into this the studio size becomes a very important thing. It certainly does, and you have people coming after us. I mentioned casually awhile ago, the symphony, for example. We regard it, in our community, I know they do in Cincinnati, in St. Louis and in other places, as having some responsibility to the community to make the station possible for providing cultural, as well as educational opportunities for the people who support the thing. When you do this, and bring in a symphony orchestra (I don't know what the number of pieces are but say roughly 70 or 75) then this thing about the 10' on each side, Pat, becomes a very critical thing. Because, I don't know, someone earlier in the meeting here today said something about hanging the cameras on the wall. We've nearly done that! There's no opportunity for maneuvering cameras in a situation of this kind at all. Now I'm not talking about in-school telecasting where you have a teacher; I mean a teacher and two or three or four or five kids or maybe a class. But here you've got the bassoon, you know, the base viol, and all the rest of the stuff that goes with it.

9 - 398 Plus all your lights off the floor.

12 - 399 And a lot of lighting. Teriffic lights. Stand lights as well as the street lights. We have a fringe for cameras and the fringe comes just on two sides. You can't get it on the four sides, so this is another of the casual things that might seem to be of first class importance.

V - 400 That's a very serious problem.

3 - 401 We're solving that very easily with a remote truck.

V - 402 We can't.

3 - 403 Well, that's what I say. That is the reason I'm saying and keep talking for a minimum of 60' X 40'. I'm setting my own minimums at 40' X 60' and 40' X 40' because our problems are such we'll need these. We can set up three telecasts in a 40' X 40' area with the sets parallel and with a 40' X 60' we can have those things which we need, other than the things you do. We would not bring in the symphony orchestra; we would either go to them, telecast them there or just bring the music in and do it stereo as we are doing now, but I asked this because I am willing to change my mind after our discussions. What are you going to do on a standard telecast and service (public service) in your area; what type of production are you going to do that you're going to need an area greater than, I'm talking about floor space, a 40' X 60'?

V - 404 He just told you.

3 - 405 Well, I'm excluding this, the orchestra.

V - 406 There's a guy working in the Title 7 program in Washington by the name of Walter Stone who could use up 100' X 200' in doing a show, and use it legitimately.

3 - 407 Oh, yes!

V - 408 We have coming up as part of our Title 7 project, which represents 400 shows during the next two years, two-four lens programs. We have two studios 40' X 60' and we're having a tough time right now working in all the responsibilities for this Title 7 project in which - - -

V - 409 I don't know what they are but I mean I'm saying we're here. We've got a little studio no bigger than this.

V - 410 We all consider our studios too small. We all wish they were longer, yet it's amazing the amount we can do.

4 - 411 I based this on a three camera operation, not a two camera operation.

9 - 412 Let me remind you - come studio, come storage space too.

0 - 413 We're not talking here in terms of what we're doing and what we would like, but let's think here in terms of the idealistic way. If we had to start from scratch how would we do this thing? That's what I want to know.

V - 414 Then I would double it. If we're talking idealistically, then I would at least double that figure that we made.
Two studios or twice the area in one studio?
Well, both.
Are you saying that studios become stereo in the . . . .
My big studio would be a lot bigger than 50' X 75' if I could do it any way I want to.
How much storage area would you have?
The rule of thumb is get as much as you can.
No, if you're going to have dead storage you better.. You get into four figures and write them down.
I know it runs up into money.
No, it runs into feet, cubic feet.
What about the height here?
How high are we going now?
50' X 75' by what, 15'?

1 - 415 It's according to what kind of a process you're going to use. If you're going to use pin rail and batten, it's one system. If you're going to use a fixed grid it's another height; if your going to use fixed grid without jacks it's something else.

V - 416 Well, you've got your acoustics to worry about.

1 - 417 I would like to say something about this studio situation. I think we're coming back to Ray's point of the Parkinson's Law. Studio space and the amount of money that it costs multiplies very rapidly after you get to a certain size. I know; I just designed a communications layout and having nothing except budget limitations, I settled on 40' X 60' studios, three of them, because this was a less expensive undertaking than going out so wide.

4 - 418 That's why we bought the 40' X 60'. But I would (here we are in a position in San Diego where we send a number of things out microwave) say we are intra-campus and the number of times that have been pushed with 40' X 60' is really wonderful and I don't think that we have been put back; I think that we have gone further ahead, possibly.

V - 419 You've got air-conditioning throughout, haven't you?

V - 420 You bet we do.

12 - 421 If you're going to talk in terms of plans again, the question is how much money do you have now and how much do you think you can develop in the future? How many of us have started with a 40' X 60' studio? We had a room originally about 40' X 60' in which we had the studio, the art department, the scenery department, the desks and everything else, and we finally grew out of that, but I think this is the kind of thing you hold up to people as they plan for the future. I don't think you start them out, because they can't always afford it, but you say you can get by with this maybe for a year or two or whatever; here is what you ought to be looking for.

4 - 422 Now listen. Let me argue that point for a moment. I know this is true in the west, as I have gone up and down the coast. There is much more thinking in the terms of the philosophy of building a mansion first, and maybe you can't equip all of it, but it makes sense to many of these campuses out there that are building constantly to get the plant that they don't have to add to. Consequently many of the new schools that are coming up in the west and the schools that are putting in radio and TV for the first time are putting money into big plants.

12 - 423 Casually we have used this word psychology from time to time during our discussion today, and if you're talking about people who are planning psychologically, I think it's good to say, "Well, why don't you start with this and move, and if the needs and demands are great enough you move to this?" Because somebody also said around the table here today that there is nothing that upsets superintendents of schools and colleges etc. to get a big building with equipment and you only use it a relatively small portion of the time.

8 - 424 You're also apt to be caught in a position like Purdue where the TV facility, although it isn't finished yet, is in the midst of a great big multi-million dollar building and the size you picked when that was built is the size you're going to have for the next 50 years.

V - 425 That's right.

8 - 426 And that's it - period. You're not going to rebuild that eight million dollar building.

2 - 427 I've got a visual here that's worth a lot of money to you. When you're building a new building you cannot predict conduit space; there are just too many things that get into conduit; any size that you put in will be too small. Our people at Penn State are furring down this part of the hallway - this is the hall - there is the wall space, you take this out,

2 - 427 put in tons of cable and you can go to any of the classrooms, get out here into the floor area or out here into the ceiling area.

4 - 428 And those are non-bearing walls between?

V - 429 Your architects are up to 1920, most of them go back to 1890.

2 - 430 I would like to make a few more comments. One is that architects, when you get them in a situation where they don't have to be defensive, are very anxious to learn what we want, but they won't tell you that when they're in official conferences because they've got to play the game as knowing all the answers. So if you can make friends with your architects, take them off and have a chat, you do the job and then follow through.

1 - 431 I would like to add to this, that once you start a facility with an architect a man should be relieved so that he can spend half time with that architect every minute of every day that he goes in and out.

2 - 432 Well, I think this is impractical in the way pressures are, but when you meet with an architect in program planning, you say television is going into this building and then you meet with him with rough sketches. If you withdraw at that time you're likely to find yourself in the situation that we're in now with the building we thought we were designing for television. We got a $10,000 additional expense to get television into the building and it's new, it's being dedicated tomorrow. They didn't bring the power to the right place, they didn't put in certain partitions that were needed.

V - 433 And we can buy all the expensive equipment in the world before we add 10' to a building.

5 - 434 Your study has to do with equipment. It does not have to do specifically with ideal studio space, or does it?

0 - 435 The title of it is "Technical Equipment and Facilities." Now that is pretty inclusive. We're going beyond nuts and bolts.

11 - 436 You better talk about where you can put it. You've got what's like putting an automobile motor in a red wagon or something like that.

5 - 437 For the last few minutes we've all been talking of the need, it seems to me, of a pretty exhaustive study as to what makes an ideal studio or studios for these various objectives we have to meet here. Wouldn't it be wonderful if somebody like Education Facilities Lab. could come up with as an exhaustive study pertinent to television studios, layout of television studios, as they have done in the study with

5 - 437 classroom utilization? What I'm suggesting is, if this group feels the need serious enough, maybe some sort of a resolution or strong word or a concensus could come out of this, possibly to the U.S. Office, that such a study would indeed be appropriate. Perhaps it should go to President Gores himself.

0 - 438 Well, gentlemen, we're trying to be the architects of tomorrow's planning, so let's make our comments short and try to tackle all the problems at least briefly.

1 - 439 I would like to make a comment on storage space. Someone said double the studio size; I would say that this is inadequate. Go just as far as you can possibly go with storage space, just as far as you possibly can. Then I would like to ask a question about the maximum or optimum good height. I'd like some answers on that.

3 - 440 I surveyed about 10 studios. Anything above actually 18' is for film or not used at all. They brought their grid down to that level. The angle of the light, about 22 degrees, is what we need and however you can get this is adequate.

12 - 441 You're absolutely right on the storage space; twice is not enough. But you can get enough pipe in your studio, you can get workable storage area on sets that you use; frequently, we fly them.

4 - 442 I am sure you people are aware of some of the new policies in the networks on key lighting. Your very magnificent (NETRC) film that was done on lighting is very good about your key lights up high and so on. The latest thing they're pulling (in Hollywood anyway) is pulling the key lights down in the same areas that they use for color and the key lights are straight on in. And those lights are coming down so low, so straight in, you have to duck under them. They're down an average of six feet (off the floor).

3 - 443 Coming in this way flat?

4 - 444 Absolutely flat.

2 - 445 I would like to enter a small dissent on this storage business. Looking at a university over all, storage space is something that you can't afford to have in large quantities in the golden central area; and I think, looking at our operations and at others too, there is a lot of this junk that accumulates around TV studios that can be pulled out on the periphery and stored 'til needed and then be brought in by truck or something like that.

1 - 446 This would depend on how much live production you do, Ray. If you do a great deal of live production in which you need a lot of depth and material, you must leave it.

V - 447 Yes.

2 - 448 My suggestion is that you plan your equipment for multiple purpose; plan it flexibly; plan it so that it can be collapsed and material that you're not going to use should be tagged and gotten out on the periphery of your campus and then brought in when needed.

12 - 449 You can do this primarily with instructional programs, either the college or the in-school variety. When you get into this thing that I was talking about awhile ago, broad community adult education programs, then you cannot do this.

2 - 450 Well, I think the principle of that statement would apply there to. If you need it you keep it, but you make it compact or you make it so it folds up or you can fly it and get it out of the way.

1 - 451 But you need so much of that.

4 - 452 Well, do we ticket a staging area or is that something we kind of forget about and hope that because the staging workshop is expensive that it will kind of go away and solve itself?

V - 453 Have you people had the experience?

9 - 454 We have a person who is responsible for checking that particular [illegible] point. [illegible]

12 - 455 If I may, I would like to modify your suggestion and that is to have your new buildings so that you can include television.

0 - 457 Well, I think that we've got about three things here that need to be talked about very seriously, one of which, I hate to go back a step, is color. Where are we in color in connection with educational television? I don't care if it's direct instruction, broadcast or what it is. What comments can we make about color?

V - 458 We've only got one authority on color here.

0 - 459 I want Fred Remley to comment about where color fits into education. Tell us about color, Fred.

7 - 460 Well, it's just another thing to be considered when you're trying to choose your equipment, I think.

V - 461 $45,000 a camera?

7 - 462 With due regard to the utilization in medicine and dentistry it's a must, at least in our opinion it's almost mandatory. There are those that would argue otherwise; it's certainly not very important in probably the majority of applications, but it's a very effective tool and it's not nearly as bad as people would lead you to believe; the same engineer can operate color.

V - 463 Do you have image orths in color?

7 - 464 Yes.

V - 465 I'd love to have it but I wouldn't sell others a little short just to have color.

0 - 466 It doesn't appear to be eminent right now in the over-all education program, other than in special applications.

1 - 467 But if you are planning color, Fred, shouldn't you plan then adequate lighting facility, adequate cabling, power supply, air conditioning?

7 - 468 Well, dimmers aren't much use in color, don't forget. Color rendition varies with lamp filament temperature. What you need is plenty of circuits, not so much dimmers, you know.

V - 469 Yes, well, light control.

7 - 470 We find in our case that with air conditioning, the rack space is probably as big a problem as anything.

6 - 471 I should just like to repeat that I believe color television is important for educational or commercial programs and let's not sell it short.

7 - 472 I agree.

1 - 473 I think it was designed basically to handle the components.

7 - 474 It's most desirable when buying your equipment to keep color in mind - your switchers, your distribution amplifiers and this kind of thing.

V - 475 Yes.

9 - 476 Your problem is that while color hasn't done well - commercially - yet, just this year for the first time, RCA's color set division has broken into the black. The Japanese are now marketing two color sets in the United States and I consider these very ominous signs, because it's thought that when the rest of television is in color, we're going to have to be in color too--and it scares me.

V - 477 We surely are. I don't know what we can do!

6 - 478 I'd like to suggest that educational television should be allowed to take advantage of the use of color as soon as, or before, commercial stations.

9 - 479 Well, yes, I would like that as a principle, but I can't get the black and white equipment that I think I need.

5 - 480 But how many million sets will have to disappear from homes before this?

V - 481 That's right.

9 - 482 Well, when it happens though, it can go just so quickly. You know, we watch these developments.

4 - 483 If Detroit can sell several million automobiles in a year, they ought to be able to sell a few million TV receivers, I think.

V - 484 Yes, but before color.

11 - 485 Well, I think color is important to keep in mind because there are some universities (like Michigan, and I suppose Illinois, etc.) where the whole medical setup is essentially separate. I don't think it is at Michigan so much. In many cases, dentistry goes its own way, medicine goes its own way, both quite separate from the planning of the rest of this. It seems to me, that somehow or other, taking cognizance of the importance of color not only in medicine, but in various other things such as the humanities, that once again, the point is that some organization has to emerge. I know some universities where there are at least eight or ten setups on the campus coordinated by nobody! The dean of the school of medicine is in charge, I mean is responsible for one, dentistry for another etc. The amount of equipment there, the number of millions of dollars represented in the investment makes it seem to me that some sort of coordination would make the color accessible to others and the others accessible to those in medicine. It seems to me we've got part of an environmental problem in the sense of administrative environment as well, involved here in color. I agree in the things that I have had any hand in, such as medicine and dentistry. If you're going to do it in black and white, now that color is here, you might as well throw it away because you cannot get perspective; you cannot get contrast. Color is absolutely essential in certain things, but the number of things is still fairly small, I think, in education.

6 - 486 Well, Harry, I may disagree. I've watched a TV show in black and white and it seems like an ordinary television show but when I switch on color I enjoy it much more. I've tried to tell myself it's just a gadget, it's new, eventually I'll get used to it and I won't notice so much difference, but I just don't believe that's true.

V - 487 It's a great talent I agree.
If color were popularized, it could leave us sitting here months or years behind.
More affirmitive discussion.

11 - 488 What's the adaptability of Ampex Videotape to color?

V - 489 It costs about $20,000.

1 - 490 You wanted a short discussion. Should we summarize by saying that people should plan adequate conduit, lighting facility, power sources, and be sure that they have the space to go into color telecasting.

V - 491 Right! And worry about the development in the meantime!

0 - 492 I think that's about all we will do with color. Now I want to hit one more area that has to do with staging and lighting. Is there anything about educational television, either closed circuit or broadcast, that has real significance in terms of special lighting? Do we need to talk about staging?

7 - 493 Just the fact that the information is available on how to stage a show well and how to light it well, but the rules are seldom honored!

0 - 494 Well, is this area anything we should be concerned about? Is there anything peculiar or special about what we do with an educational program which is unlike standard broadcast practices?

11 - 495 All we can do is emphasize the importance of both points because many of the other so-called frills of production are not available in the tricks and gimmickry. Therefore, if you have a simpler show, it is to be articulate and comprehensible. It should be properly lighted and you should have proper contrast because people are going to have to concentrate for long periods.

V - 496 Yes.

4 - 497 Now here's something more which is the interior decorating problem. We just can't afford a lighting expert.

10 - 498 Well, something that would fall in here, it seems to me, is the thing I've heard. I know; I can't speak first hand, but you know the problem I'm sure. The availability of gas, compressed air, water and adequate drains within a studio is necessary so when the talent comes in with a dog that's about to die, he's got the necessary things to accomplish the demise as it should be done--this is one of the hardest things to sell. We had everybody going right along with us until we wanted to pipe water into the studios.

1 - 499 I think it is an excellent point.

12 - 500 This comes back, I think, to the point made here earlier today about protocol on the air; you treat all of them as being pretty important. This means lighting and staging.

5 - 501 Too often, far too often in educational television, regardless at what level or what objective we're trying to meet under the excuse of education we permit things to be done which should not be done!

4 - 502 Indeed so. Far to far.

12 - 503 Or some person within the organization, whether it's the director, the producer, the station manager, the engineer or whoever it is, says, "Well this is not as important as this." And that stuff filters down through the whole organization and consequently you get a poor production job.

8 - 504 When it goes on at three it's got to go on at three; important or not, it still goes on at that hour and no doubt about it.

4 - 505 We've had very good luck with modular sets.

8 - 506 Something has to give, but what do you give? Lighting? Set dressing?

V - 507 But is there a point where you should give, perhaps?

5 - 508 Is there a point beyond which you cannot make compromises?

9 - 509 I do think a lot of it is just contagion from educators because some of them have been doing it that way for so many years.

4 - 510 I think more of the problem of bad lighting than the difference between vidicon and image orthicon cameras.

V - 511 Oh, definitely.

5 - 512 To come back to Ray's point, too often the man that makes the final decision is not equipped to make the decision.

5 - 513 This extends far past the area of just lighting and staging etc. At the risk of making my hosts uneasy (this is dangerous to say because I have not actually seen a Hagerstown production), I would guess that the Hagerstown people could probably improve the production of their programs X percent - whatever that percentage is - if they were to use communicators; if they were to use professional producer-directors

5 - 513 rather than the junior college (as you told me just a few minutes ago) students. The only point I'm trying to make is that this need extends past the area of staging and lighting and into production.

12 - 514 I'd think in all defense here that you would be rather surprised at what they get out of it.

V - 515 I'll buy your basic terms; I'll buy them.
You'd be surprised at what they get out of it.
We're using student cameramen ourselves.
I just want to get it into the record, that's all.

11 - 516 I think you're right, but I think it would be even better with the so-called professional or more adult experiences in this thing.

1 - 517 I have watched the Hagerstown operation and I plan to spend tomorrow afternoon doing it. I will support you, Jack, and I will document it after I watch tomorrow afternoon's session.

0 - 518 Well, these are significant facts, because staff requirements is the thing we're talking about right now. We might address ourselves to this problem. It's not necessarily what you want to do, but what you have to do to get in this business and stay in it. If results we get (in Hagerstown) under a second choice arrangement are as good as they are, I just wonder how good it might be if we went the full distance! Let's talk some more about this staff; we talked about engineering to a point; does anyone want to make a statement as to what the engineering requirements are? We certainly are going to broadcast standards, at least equal to and better if possible. Any who disagree? Earlier we discussed the communicator; we said that the person who is actually directing the show should be a person of multiple skills. He doesn't necessarily have to be a professional educator but he must know how to communicate ideas via TV. Now, who is this fellow? One who knows this business; one we all look for and hope we find? Actually there aren't many schools or universities preparing these people for this kind of work. Will anyone comment on that?

2 - 519 Well, I think you've got your finger right on the two critical problems. One is the critical problem of the assistant engineer or the engineering technician who we are not turning out in sufficient quantities. The center is very much interested in that as most people are too, and that is setting up programs for training these assistant engineers. We're proposing to pick up individuals who have gone through what is now being called "Associate Engineering Training Programs," two years of engineering and these programs are growing and give them internships at Penn State and I should think this would be a good thing to do elsewhere.

1 - 520 That's an excellent idea.

2 - 521 That's one of your critical needs.

V - 522 That's a good idea.

2 - 523 You can talk all you wish about communicators, but these men are scarce; they're rare. I don't know whether they're becoming extinct or not but there are not enough of them. Next that's more scarce is somebody that can do research in this particular area. I don't think that we're training enough of these people either. In other words, it seems to me that each institution ought to take the responsibility, as a minimum, of reproducing itself. It's a good biological law.

V - 524 Each one teach one.

2 - 525 Each one teach one, or at least staff your operation with proper exchanges.

4 - 526 This becomes a tremendous job! You have all of the commercial boys taking a look at what you are training and grabbing them before they even finish.

V - 527 Before you even have confidence in them they're apt to lose interest or even leave.

1 - 528 I would like to emphasize what both Harry and Ray have said. One of the most serious problems that we're currently facing at the Center (NETRC) is professional development, and we do not have enough people in the field. We have many, many propositions open and don't have the applicants to fill them, so the need for trained communicators is very acute.

0 - 529 We haven't hit upon this total personnel problem. We've talked about the engineer, the director; who else are we looking for? Any specialized people with specialized training? Are there others?

1 - 530 Staging and lighting people!

4 - 531 I'd like to investigate this director question in a minute. I'm not quite sure that I understand the question. You use the term communicator, and you use the term director. Are you referring to what I might call the producers?

V - 532 Producer-directors.

4 - 533 In other words he is the man on the planning; not the director from the technical side of it or the man calling the shots in that sense.

5 - 534 Perhaps we need to define some of these terms.

V - 535 That's right - in production.

5 - 536 The communications specialist, the producer-director - the television production coordinator - call him what you will -- is vital to quality TV instruction, in-school or out of school.

V - 537 Directors, in a sense, think of themselves only as technicians. "Bring it into the studios and I'll put it on the air" feeling.

V - 538 That's right. Much discussion - disapproval.

1 - 539 No, I'm talking about mass communication specialists who are trained in the methods of mass communication. Now he may also be a technician, but has the broader concept.

5 - 540 This person, the producer-director, is a member also of this team, working beside the studio teacher. Another member of the same team is the art-graphics - photographics resource person. He, too, is essential to a good instructional program.

V - 541 Yes.

12 - 542 When we bring in a teacher we find these people to be of value to the teacher who knows nothing about television. The director's primary responsibility is to take the work at the studio level and make a show out of it. A producer whose primary responsibility, or responsibilities are about talent we call producers. You might call them something else. Some places they call them coordinators. We call them producers. We find that the arts and graphics man, that Jack was just talking about, also is very helpful. There is somebody in the curriculum area of the schools who works with them from the standpoint of content. We stand on the fence and say we know nothing about anything so we refer all of these things to the appropriate person in curriculum. As a result of this, the teacher's position is pretty well aggrandized to such an extent that he becomes an authorative person becuase of this back log of help he's getting rom these four different kinds of people.

0 - 543 There are still staff requirements in which I am very interested. We have hit several of them and I am thinking now of the cameramen. Who are we looking for in the cameramen? Is he a specialist in himself, or is he just a man off the street?

2 - 544 He is a bright student who has been put through a brief training program and given an internship in a testing program for his reliability, dependibility and performance.

3 - 545 And he's one who likes to run a camera. What motivates one to run a camera?

V - 546 Does he have an artistic sense?

11 - 547 He would not need to have an artistic sense.

V - 548 A cameraman? He should have a feeling for it!
Picture composition ought to be up the line from him.

4 - 549 This is so good the networks will pay a bonus for picture composition.

V - 550 Well, composition - yes.

1 - 551 May I say that I do not believe that a man should ever rise to the position of director or producer without first having been a cameraman. I think one of the first requisites for a good cameraman is that he thinks like a director. He is going in this line. In educational television, this is particularly important. (This is one of the biggest problems that the networks face. The cameramen are engineers).. They think like a director. A cameraman that thinks like a director is the most valuable asset this man can have.

0 - 552 Does he have an artistic sense?

1 - 553 He has an artistic sense and he thinks like the man that he is working for.

V - 554 Some of the best commercial directors that I have talked to feel just the opposite.
They've never worked with artistic cameramen.
In practice it's often a tempermental situation between artistic producers and artistic cameramen!

V - 555 Discussion
It's almost too much for me to reconcile.
The director wants control; he doesn't want that cameraman to do his thinking. He'll do that. The cameraman does what he's asked to do.

1 - 556 For rehearsed shows this is good, but we're talking mainly about unrehearsed productions.

4 - 557 The man you can give an area assignment to and doesn't need to be checked for his picture, but it's there, is a good cameraman.

0 - 558 Now, let's talk about the teacher in front of the camera. Can we explain or describe this personality? Who is the person in front of the camera?

V - 559 He's supposed to be good. What this means nobody knows, but you can usually tell.

1 - 560 I would like to make one more comment in terms of staff requirements because they are very closely related. I think the competentency and the attitude of a staff, in working with a teacher or talent of any kind, can be very, very important. If you are using a professional staff with a professional attitude, you get one kind of a thing out of a teacher. If you have a lackadaisical staff, you get another kind of performance out of a teacher, because I have seen it happen.

V - 451 That's right!
TV coordinator?

11 - 562 He's talking about all of the people being the most competent people who command respect.

V - 563 By believing in what they're doing.
Their assistance is important too.

11 - 564 They don't need to be nearly so good as they need to be dedicated.

5 - 565 We realize that all educational television is a series of compromises.

V - 566 Yes.

10 - 567 From what we have said, you cannot find many people here who would qualify for less than the rank of Associate Professor, and it seems to me that you cannot run this thing with all chiefs and no Indians.

3 - 568 You talked about communicator, director, producer. How many teachers is he going to contact and how many telecasts is he going to have as a load?

V - 569 The producer?

3 - 570 Producer-director or the communicator.

11 - 571 There's no answer to that..

V - 572 We'd better not get into that.

2 - 573 The kind of course coordinators that we have are likely to be graduates from Syracuse or Boston University Schools of Communications. This is what we're trying now. We bring them in on the staff. We give them some experience and as soon as they measure up to our standards we assign one to an instructor. It is more important to have that continuity, the complete familiarity, each man knowing the other, than it is to consider questions of load. On the questions of load, it depends on the course. The labor, the course, the frequency of the course and the content of the course must be considered.

0 - 574 I think we're very much in unison on this. What do we provide this teacher, this professor? How do you back him up? What do you give him? Do you give him a director-producer? Do you give him an assistance in way of pulling together information, writing the script, etc., etc.?

4 - 575 As far as material is concerned, he finds a student assistant in his area. He is given the money, another budget (for the student assistants, or other resource people). I wouldn't think in the area of radio and television that I would help this man with his course content. But once he has that content, the producer-director (however we're defining him) will help shape this material.

11 - 576 He should have access to all graphics and all the rest of it.

0 - 577 Who translates the message into this medium?

9 - 578 The teacher and the producer-director do this together.

12 - 579 We actually have, on an average, about six shows per week for the producer. He is not a content specialist; he is a leg man and an extension of the teacher. He's an extension of the teachers legs, the teachers eyes, the teachers thinking, etc., etc. But this team idea, I think, is important. If we go around the table, you'll find that all of these operations vary somewhat.

0 - 580 What is the teachers load? What is required of this teacher?

9 - 581 I'm going to speak on this point because I feel very strong about that; I think anybody who teaches a course on television should do nothing else.

V - 582 How often (does he teach)?

9 - 583 Whatever the course is in the college, it's never daily. Some of ours run two 45 minute periods a week and I think that's enough.

12 - 584 Well, Bob, get out of the college; get into a public school situation.

9 - 585 I think his load should be about a half hour a day of the same kind of thing would be the equivalent. Now the second time around, it should be easier.

1 - 586 I would like to ask Ray a question. Ray, what kind of proportion do you think exists between reduction in load and improvement in course content in your operation?

2 - 587 Well, the maximum demand that we have is the two for one. "I'll teach a TV course if you'll relieve me of two regular courses."

9 - 588 What's your normal load, three?

2 - 589 Three, sometimes four; 12 units. All right, in other words, if he's teaching twelve hours, he's very happy to do a TV show for two hours credit. Is that correct?

9 - 590 For six hours?

2 - 591 This, I think, we ought to play by ear and it is what we're doing. In some instances the instructor says, "Why should I have any reduction in load? I don't want to give up these courses and I don't put any more work on this than I would if I were teaching a small class." You have that kind of a person. Now then, the limitation here on production is principally the back-up resources which we are unable to give to these instructors, and this is where we are curtailed. In the films, film strips, transparencies, slides and all this business, there are two limitations. One is that we haven't (we don't want to) centralize this. If I were offered the money to do it, I wouldn't take it because I think this is a department function, and we have made it available to them on an out-of-pocket cost basis where we can't get this money into the departments, but we can't get the departments to use their funds in this way. The other limitation is lack of people in graphics and studio slide work, to back them up as they should be.

5 - 592 In reviewing the Fund for Advancement of Education in-school projects across the country, I think we will find that it is the rule rather than the exception that the studio teacher teaches one course. It is his or her full time load. At the college level, this usually does not hold true. As Ray said, it's by and large a one for one (in some cases a two for one), if you're lucky maybe even three for one reduction.

4 - 593 How much time does he have if it's a repeat course? How much time do you give him then?

V - 594 There is not really enough experience on that.

5 - 595 There is not sufficient experience here to answer.

12 - 596 Then you mean in the case, in the Fund for Advancement of Education, if a person has one lesson a week it - - - -

9 - 597 We've got a professor who is not only teaching a full course, but is chairman of a department with 26 members, is writing a textbook and is teaching a graduate course. I still think that if he were just doing a television course, it would be a lot better. I think it is very good as it is. I think, as a basic principle, this is all he ought to do.

1 - 598 This is what I think we should establish. By reducing a man's load, do you get a consequent increase in quality? You know, is there a point of no return?

V - 599 How are you going to find out? How are you going to prove it?

0 - 600 We're trying to write a formula, and we're looking at experience and what has been happening. Can we improve on it as it stands? Are we happy with what's being done? Is this about the right ratio? Are we upside down on this or are we about right?

4 - 601 Out of four courses, he ought to get at least two off when he's devising a TV course and one off when he's repeating it. It's the formula that we arrived at. That isn't good enough, I'll grant you that.

2 - 602 I think that one of the very few revolutions that's taking place in education is likely to affect our operations here and that is the concept that a course is something that is produced with enormous resources by a group of people, one at a time, and then it is very widely distributed. The MIT Physics course, the American Institute of Biology course, the chemistry courses, the math courses that are coming out, etc. We've passed through the time when one professor goes off and writes a textbook, even if he is in Texas! The preparation of courses and all the materials that go along with the courses are becoming institutionalized.

5 - 603 This leads into the interesting speculation; to what extent will the Airborne courses, that bear out just what your saying, be used?

V - 604 Other courses too!

9 - 605 Well, there's a whole trend, of course, to your exchange. I mean the Microwave Project, the Airborne Project, the thing that John Meaney got going for the Fund (which is supposed to be an exchange of courses), and the only thing, so far, that's come out of it is a tentative agreement between Oklahoma and Houston to exchange Accounting. I don't know how far along it will get, but this was the text of a meeting of the Southern Regional Education Board that I attended a couple of months ago. I think that this is just bound to grow as people discover how difficult it is to do one of these things well and how few resources any of us have. Then the natural tendency is to say, "Well, you give me one of yours and I'll give you one of mine," and this way we both get ahead a little farther.

5 - 606 It's a natural kind of revolution. Whenever people get into instructional television they insist on having local control, they insist on being able to produce all programming themselves. With experience, once a full realization of the time, effort and funds necessary to produce an instructional course is realized, ETV project administrators re-examine materials recorded elsewhere for possible local use. This appears to be a general pattern.

3 - 607 Yes, but can you give me specific examples of people who will give credit? (You can do research on this; you don't have to adjust levels). How many people have used and accepted Continental Classroom at the college or high school level and used it? (and said - "Oh, this is fine, we'll give you credit for it"). That's all I ask.

V - 609 321 classes? Something like that - 256.

9 - 610 I don't think that's a good question actually, because I think you need to put it the other way around. How many colleges will, under a given set of circumstances, use outside teaching?

3 - 611 How many departments will accept somebody else's teaching?

9 - 612 Well, this has been one of our big problems with the microwave project. However, I may say that with eleven colleges involved and at least eight departments, our problems, while they are by no means over, are pretty well in hand on this score.

12 - 613 I think you can make the question even worse by saying, "How many school systems will accept third grade science?"

V - 614 From Boston?
From Boston, or Denver, or Albuquerque or whatever?

4 - 615 The important question is, how many are going to in the next 30 years?

V - 616 Approval of question - likely thought,provoking at least.
We've got a lot of 1890 customs now, but they've got to give way a bit.

10 - 617 The medium now exists and these task force approaches to material development have become something which is now feasible for the future. It has been only barely feasible in the past and I think we can't look to history to tell us what is going to happen with these things. It seems to me almost a logical continuation of the whole media use movement, to see task force developments of materials and eventually their acceptance on a reasonably wide basis.

12 - 618 This Title 7 will do as much as anything because the predication of a lot of these Title 7 projects is that they are done by, with the assistance of, a lot of consultant services from all over the country. It breaks down to

12 - 618 a small local flavor and I'm sure this will begin to accomplish the thing you're talking about.

4 - 619 I think we're seeing this in NETRC. A kind of production center. There are so many programs and each local area, each station has a choice.

11 - 620 I don't like to spoil the wedding party, but I would like to offer a slight dissent on this staff.

V - 621 (quip) - I'm glad that there's somebody at this table who's opposed to wedding parties!

11 - 622 On the task force business, look at decision making politically, corporately and all the rest in this country right now. You have a little example of how decisions are made when everything has to be watered down, compromised, and passed by the committee, by the task force and all the rest of them. Here is one area where I am going to stand for the right of an individual professor. Task force or no task force, when you have a genius, you don't want (I don't want any Einstein to have a committee that controls what he does) any of the rest of these things. Now, assistance yes; all the rest of this, yes! Give him support, give him the people to help him, but I must say that we are going to have some great thinking emerge (that is transmitted down along this chain of media that we have). I would, a little, rather not have it watered down by a task force.

9 - 623 When Warren is talking about a task force, or Pat is talking about a team or Jerry's talking about a team, this is not a group of historians that got together to decide what will be least discombobulating to everybody's concept of American history. They're talking about a historian and a producer-director or a producer and director, an artist and a couple of other people who "leg it" and help (and maybe a few assistants too) the teachers as with our psychologist who has, I think three of his faculty, pulling material for him.

11 - 624 You are talking about that, but I am talking about the departments that you go to. You want Joe Blow to do the chores and the department head says, "All right, provided"; and he puts many conditions on this. The first thing you know, you see Joe Blow through such a thick haze of John Doe's and all the rest of these guys with whom you have to compromise.

4 - 625 In the final analysis, the instructor is in charge of his course.

V - 626 That's right.

9 - 627 I want to quote one comment, and I wouldn't quote it excpet that it comes from my neighbor who is a seminary professor at the Episcopal Theological

9 - 627 Seminary. He had a student who wrote a very, very bad paper. He gave him an"A"because it contained the following line, "For God so loved the world that he did not send a committee." I think... , actually, this is going to be a lot less of that really, in this lash up.

V - 628 We haven't had this trouble before.

8 - 629 Aren't we talking in this exchange thing largely about "nuts and bolts" type courses? In other words, introductory courses which are reasonably factual? The Einsteins and his like, by and large, don't teach this type of course anyway.

9 - 630 There isn't any reason why you can't use the truly distinguished professor this way.

V - 631 On this basis we might get Einstein to teach Math I. Princeton is not going to talk him into this - of course, not now!

4 - 632 I think there is a very tremendous point here and that is, if the instructor can understand that this is his course, regardless of the need, but that if he comes into TV he has this team (in a sense) behind him, one step behind him, that there is no doubt but what the director-producer is going to shape this course for him for the greatest impact in TV. If at the same time, particularly if he's new, he can realize surely, that if there comes an impass that he is going to predominate, then this man is going to attempt television, because he realizes this still remains his course and the thinking he wants to put into it is that which will be done, paying the television techniques.

V - 633 Very good.

8 - 634 What happens in the 99 other colleges that this course might be used?

4 - 635 All right, if this teacher comes in new and he is going to be used in 99 other courses, then he's got to be pretty good to start with and he's probably got a certain amount of humility regardless of how much ego he has, or he has some kind of a name back of him after he's had a couple of TV courses. He's not just thinking that *maybe* this team is behind him, but he *knows* it and he knows that he's in the drivers seat, that he's in command. If these people are working with him, then the whole thing opens up like a flower and he uses it!

11 - 636 I don't want the corporate ethic, the brain storm ethic, the committee ethic or any of the rest of these things to enter in *this* business; I want to uncover unique people so that we can germinate some unique ideas and unique thinking.

10 - 637 But television does not have to enter in, you would agree to that.

4 - 638 Precisely, because television is only a means to an end.

9 - 639 I'think we just answered one of John's questions which comes much later here - about 20 pages later - where you say, "Is television a tool or an instrument?"

0 - 640 Are we, as a group of people plotting the course of educational television of tomorrow? Are we an institution or are we a service organization?

4 - 641 For heavens sake it's an institution in education and we are a means, a tool or an instrument too, define it as you will, to get good education across. We're not dealing with ITV. Now maybe when you get into the community aspects of cultural television, informational programs we might have something else involved, and I'm not so sure about that. But within the school I am very well certain, personally, that we are a service.

V - 642 General agreement. We are a service.

0 - 643 We are dealing with a problem which has to do with a product of an educator. The problem is one of dissemination. Are we going to network recorded programs? Are we going to bicycle them on tape? Are we going to film programs? When we solicit the services of a professor to do a recording (film or tape), what problems do we have when it comes to disseminating this for multiple, repetitious use? We're talking about copyrights and royalties.

V - 644 It's an unresolved problem, there are a lot of possible solutions. No real clear ones are emerging yet.
The army is very interested in it, and they've got a tenative policy on this which I understand is not for release yet, but apparently within the next six months (or a year or so at least) they will have had their say on this matter.

11 - 645 It's a very reasonable policy.

V - 646 Do you know about the new journal of teaching standards?

1 - 647 There are some policies emerging in terms of residual rights because Airborne is an experiment of some proportion and they already established the idea of allowing teachers a residual in terms of 5% of all gross revenue derived.

9 - 648 One of the things that makes the question so nebulous is, is there a gross?

12 - 649 Well, the way they figure it, yes.

9 - 650 You see, you're exchanging. Whose making any money, you know? What money are you talking about?

V - 651 Well, Airborne.

10 - 652 Well, if you're running a station in the red do they have to share your loss in this thing?

9 - 653 Houston has a policy in which they express themselves as willing to pay the instructor some residuals, provided that the programs are sold. That doesn't say anything about Houston giving them away.

3 - 654 How about re-use on our own campus? Now, we have this problem, just to give you an idea of one other question, I would like to throw this to the group. What are you going to do to the man the second year after you have decided to give him either full or half time off to prepare his course and you tape it while he is teaching it the first time and you use it the following semester? Are you going to fire him, are you going to get rid of him, are you going to give him full time off or are you going to give him quarter time off? This is the question that's going to be faced.

2 - 655 Out in Oregon, I think I'm correct on this, they have two for one: A professor continues to teach his other courses. Now that his course has been recorded and it's being used in a series of Oregon Colleges, he doesn't do anything in connection with that course but he is still responsible for it, so he's visiting these other colleges, has half of his time devoted to this program.

V - 656 His load is reduced?

3 - 657 His load is still half time.

2 - 658 Right.

3 - 659 As long as that course is taught.

2 - 660 He doesn't want it any other way because he wants to keep those two courses.

9 - 661 Our attitude is that this is a responsibility, in great measure, of the department involved. If they decide that they want to redistribute the entire load within the department, (this is what happened in chemistry) where all of the chemistry laboratory instructors had been relieved of their lecture assignments, there aren't any lecture assignments. We've got that all on tape; they haven't done anything as far as paying anybody or they've all just got that much more free time, they just reassigned everybody's load. They get the same budget they got before, so they

9 - 661 are delighted. They get that much more time for research. The German Department indicates that they are going to follow pretty much the same course.

11 - 662 You can see everyone being relieved of everything except discussion.

9 - 663 Harry, this is unthinkable; this is one of the fallacies. No matter how hard we all work, and no matter how important we all think what we are doing is, we're never going to be able to do any more than scratch the surface of this problem. The catalogue in arts and sciences at the University of Texas is that thick. If I live to be 100,000 years old and have 10 studios going full blast I couldn't record all the courses in that one catalogue in the first place - and nobody would want to in the second place.

4 - 664 And here they say that people in many departments are trying to face this, very superficially I think, we'll all agree on this basis. They say, look at all the people I could have if you people didn't come along.

1 - 665 I have some figures here that, we're talking in terms of futures (futures are now being set and established) and precedents are being established. In terms of Airborne, the teacher will be paid 10 to 20 percent above what they are now receiving plus subsistence if they are taken out of their home community. This will be for teaching one course. In the midwest project in particular, they will own all rights to the program. The teacher will receive a percentage of 5 - 10 percent for each play where it is for profit.

V - 666 Areas for profit?

11 - 667 Where it is for education, no payment?

1 - 668 Well, no profit for midwest Airborne. It may be used for education. It may be sold to a university or leased to a university. If there is an income from it, the teacher will receive 5 - 10 percent of the gross of it.

4 - 669 But what if there is no income?

0 - 670 Terms of agreement? Are there any terms of agreement? Five years?

11 - 671 They're all in perpetuity, I think.

1 - 672 Yes, I don't think there is any limit at all.

V - 673 All right!

1 - 674 Airborne is doing something of the same thing. With the Harvey White Physics series, they are releasing this program by several different methods, by lease arrangement, or sale. The one they prefer is the lease arrangement, where for $9,600, you get 160 programs. They will up-date those programs periodically, but White will receive a certain percentage, I suspect.

4 - 675 May I say something here that may be a little bit the reverse of this? Out at Los Angeles there's a teacher teaching Spanish. Some of you may know about her. She's very good and she made quite a hit in the entire Los Angeles area. She has an extra bonus beyond her salary and there are at least four stations and organizations trying to buy her, and she will probably end up not worrying about these kinds of figures but keep on going higher in pay.

V - 676 It's a case of talent going commercial when good enough.

0 - 677 Let's go to page 21 and see if we can recap this just a little bit. I think that we've expressed a real necessity for a peculiar group of people or at least a special kind of people. Where are we to expect to be able to turn to find these people--people who are fluent with communications arts in particular? Should there be more college programs? Are the present programs that are offered in various schools adequate? Is there anything in teacher training which should be offered in teachers colleges to help prepare people for teaching and, we hope, for teaching on television?

4 - 678 Where are they going to come from if they don't come from colleges? Even the networks are beginning to get a little excited about the availability of people. In the old days, because of the glamour attached to it, they could pick and choose from all lots of life and all backgrounds for that matter. They can't so much anymore.

9 - 679 What we've got to face is the fact that the market for talent of any kind, in any field you want to pick, is a seller's market. A man with ability in any field today is just in high demand, that's all! The medical schools are dying; they're taking people that three years ago they wouldn't even have talked to. They wouldn't have accepted applications from them earlier; now they're taking them as medical students. The engineers are in the same boat; everybody is in the same boat. If we don't start carving out a chunk of the talent; if we don't somehow devise programs to draw these people, to interest them as you fellows are doing here with these junior college people, we're just going to have a difficult time. It's bad now; it's going to be really crippling.

V - 680 Endorsement

4 - 681 Students come to me and say, "Gee I'm enjoying this work, how am I doing?" I say, "I think you're doing very well; I think you have some talent for this." Perhaps some advice - and then he sits down at the age of 18 and talks over his future as against the security he can get if he moves over into one of the big aircraft businesses, etc.

12 - 682 Business administration!

4 - 683 And in a quite cynical manner, cynical manner may not be the word - realistic in terms of 1960 the student retorts with, "While I may enjoy this, I could work here but this is what will prove to be best for me. I'm sorry; I can't stay in this field."

2 - 684 Here you've got a number of problems and I don't think we've faced up to them and I wish I had the benefit of this group's judgement last night at this time when I wrote three recommendations for the Pennsylvania Governor's Committee. Number one - establish special training programs for classroom teachers. Number two - survey for talent, people who seem to have the potentialities of becoming TV instructors and establish special programs over a long term - not these little summer workshops, but probably a full year's minimum or longer to develop these special kinds of people into TV teachers. And number three - do something to correct the negative effect of the regular teacher-training programs in relation to the encouragement and recruitment of people in this area.

8 - 685 Unfortunately there are many teacher training institutions where television isn't even mentioned, let alone doing something.

3 - 686 Well, now to answer your question here, we have taken a realistic approach to this and it will be incorporated in the department of education planning next year.

V - 687 At the state level?

3 - 688 No, at the college level for teachers. They have and have always had practice teaching. This is valuable experience and you cannot cancel it out and make it in lieu of this, to put television teaching in place of it, so, what we have suggested to them is, add a course titled "Television Teaching" which they could take in addition to, if there is an interest. Then they would weight or substitute it as an elective to start with. They want to do it and see what the interest is. A course like this in the curriculum will not take the place of any other course that trains teachers.

V - 689 In the college of education?

3 - 690 It would be a combination again of a producer-director with a present teacher from the college of education setting up, number one, the goal to what we're looking for, and then taking the course and using the course itself as the sound board for this and setting it up on a regular laboratory workshop basis weekly as they go. Then say Friday afternoon, each would prepare or use the same assignment, (this has been our thinking on it) the same lesson assignment which he or she taught during the week someplace else, without an extra load on the people. Then they'll sit down and bring these people back together and talk, even recording it, and talk about it to see if we can get people interested in television.

2 - 691 I think it's good, but I think it's too limited. I think the kind of exceptional person who may become the future TV teacher may need to get something from theater, from the communication arts courses.

3 - 692 He has. Yes, I think that his background and curriculum will probably take care of some of this. But remember, if he or she is going to be a teacher and is in the college of education, this is going to have to be a change at their level and not at our level. What we're doing is suggesting that they add this. I doubt very much if they have time to take theater. At our place they do take speech, but it's not this type of thing.

V - 693 Miserable!

11 - 694 A lot of you know that I'm going to quit this job and start teaching next fall. I have one seminar that I teach now, and then beyond that, I'm going to begin to develop courses. You are talking about two that I have seen as shortages in this country. I would like to give a couple of them a couple of private runs. We've had Marshall McLuhan working on a project for the Office of Education called "Understanding Media."

V - 695 Who's going to give the course "Understanding McLuhan"?

11 - 696 This had been an interest of mine for a number of years; one of them is a course (it'll take me next year to work it out, I expect), in which we begin to analyze the peculiar advantages and biases and limitations and things to watch out for in the electronic media. The other one is the one that we were talking about here, TV teaching or TV for teachers etc. I want to pioneer some of the tasks, the shortages inherent. You ask where do the people go? We've got to create such courses and that is one of them.

9 - 697 Actually this shortage extends far beyond the teachers. Our new president as of September 1st (presently our vice-president), is very concerned because the average person of middle stature in the community - the business men, the teachers, the lawyers etc., is ignorant of the uses of the media. They all have to appear on television and they never know what they should do. They all have to appear on radio at some time or other now. In fact, he's concerned because they can't even use public address systems which are logical extensions of the same idea. So we have been revising our curriculum in order to get way back at the basic understanding problem with students at the sophomore level, drawn from the college generally. We think that this has very real promise if he gives us the kind of support that he indicates he's going to give us. We will begin to create a kind of media literacy, an interest which can lead to the kind of program that Ray is talking about and the kind of thing that Harry is talking about. But I think you're going to have to back up a little bit and get them when they're younger. You're getting them here with the junior college and can begin to get them at least in tune with the electronic era instead of being antagonistic, as they are by the time they've gotten up to their senior year and they're finishing their teacher's certificate.

0 - 698 All this has a very interesting flavor. I would like to point to Hunter College for just a moment. I believe some of you are familiar with the work there, some of you more than I. Does this service of television offer a training device above and beyond what is normally done in an ordinary teachers college when it comes to teacher training?

V - 699 Why there's no question about it!

0 - 700 Dick, will you make a comment?

8 - 701 Incidentally, he (Schuler) has an advantage accruing to TV as a teaching device, although this is not part of the project. Well, briefly, what they're doing is using TV, three remote control cameras, in a classroom, as a teacher training device. The student teachers watch, not only highly skilled, but what I would call master teacher. (The teachers are always giving me heck for using the term.)

V - 702 Terrible term - in their eyes!

8 - 703 I think it's the most appropriate term I've ever heard, but they don't like it. But anyway, you get the idea. They watch these people teach by TV; they watch each other teach by TV; through kinescope recordings they watch themselves teach; I can't conceive of a better way of evaluating what is done in the classroom than using this device. As I say, incidentally, although I am sure this is not quite the purpose of this project, they've had a lot of implications for future

8 - 703 use of TV in the schools, teachers who go through this, using the system and being able to observe it in action, even though in another connection.

0 - 704 Are there any other professional people we should include as the kind of person we would like to think colleges and universities would be helping to prepare for the mass media? Now, we've talked about the teacher, the director and the producer. These are professional people. Are there others, the artist, the communications expert, other specialists?

V - 705 Mention the engineers.

0 - 706 Should engineers compare to an equal professional caliber?

V - 707 Second level engineers, not professional.

11 - 708 I've got one level that I'm going to aim at, and that is, I made the remark that we don't have time to wait for all of these young kids to grow up. One of the first priorities is going to be an adult education course, at this level, at the community level. One that is for the people of the community and so forth. Begin to get it out and try it on a different kind of understanding and different kind of person there, essentially the same course.

0 - 709 I think we've hit all the areas that I'm interested in that I can think of. Is there anyone that holds a reservation?

V - 710 There's the research matter too.

0 - 711 To back up your statement, I'm assuming what you want is somebody at the whole of the TV operation and evaluates what is actually happening in all areas. This is as important as the program evaluation!

8 - 712 I think this type of training is increasing, Warren, isn't it, but the trouble is not as fast as we demand.

10 - 713 Not nearly as fast as demand.

0 - 714 And I think one that you're probably implying and not stating is the fact that it does not necessarily include our ordinary concept of how you measure results of a learning process. In other words, we have a new teaching medium, a new process of education.

10 - 715 That's part of it. Take cognizance of the entire testing problem.

11 - 716 Well, the thing that I wanted to say, I had intended to say it about four hours ago, was that Warren has pointed out how much data is lost by the absence of record keeping and particularly some standards of evaluation or people to assist with the evaluation. Whether you're

11 - 716 trying out new equipment, new methods, new organizational structures, or no matter what you're doing. I would hope that somewhere in your report you would call attention to the fact, we're pioneers. If you'd look 10 years into the future, this is the bench mark activity for coming generations in electronic media, in education. It will be a tragedy if there isn't responsible evaluation, responsible as we can make it in reporting now while we're on the ground.

V - 717 What about the last ten years?

11 - 718 It's been too little and it's too little now; that's why I say we should ask for it.

V - 719 We have no time, and we haven't got the people for that. The administrator can't look at that as a responsible historian's role with the position he is in.

0 - 720 Are you willing to put any kind of evaluation on present facilities? Consider the engineering aspects of the educational program. In my original statement I said 0 would indicate a starting point, or nothing; and 5 the optimum - the perfect situation today as we know it. Obviously 5 isn't going to stay what it is today, tomorrow it will be 5 plus something, but the point is, relatively speaking, where are we?

V - 721 0 and almost on our way to 1, I would say. Put 1.

10 - 722 For the sake of argument, I would say that perhaps we're at 2 or 2 1/2 on this five point scale. Certainly no farther than 2 1/2 and probably not as far as 2.

V - 723 Concern over our position.

0 - 724 I would like to think that you fellows are familiar enough with the state of the art of communication that you would be able to state some relative position with a degree of proficiency. You can't build something unless you envision what the end product is going to look like. Now don't tell me we don't know how television is supposed to look overall.

8 - 725 I'll make a statement. I'll make a statement and without implying any desire to discourage the engineers to making further advances, I would venture the thought that engineering is still six jumps ahead of the rest of us who are still trying to figure out how to use the tool.

V - 726 Concern.

8 - 727 On such a scale, I would say that engineering is perhaps a 2 and the utilization of the instrument - maybe 1.

9 - 728 Well, I don't know what you mean, I come back to this question. I don't know what you mean by 5. Do you mean, do we know enough now, as a group, not this group exclusively, but as a national group, do we know 5 worth or 4 worth or what? Do you mean how far have we come in actually developing the facilities? The answer to that is not very far. I mean, let's face it. We've got 47 stations on the air and no matter how you look at that, that's a miserable situation. It's better than it was, but it's still lousy. You know, on that scale if you say 5, we've come 2/10 of 1. Now if you say it on a scale of what we know collectively about the use of this medium for teaching purposes alone, cut it down, I think we have come pretty far, maybe 2 1/2.

V - 729 Certain discontent.

4 - 730 If this represents what we have done to this stage, we have in terms of technical attributes, 5 might be profiled as an operation that has video tape, micro-wave, transmitters, (one or two channels) and closed circuit. If that's 5 in terms of the whole country maybe we're as far as 2 1/2.

0 - 731 I think we're pretty close together. I think we all face this as being an unfortunate situation. We know what the problem is, and we don't believe we're as far as we should be; I think that in itself is significant. I think we're recognizing the fact that we have a lot of work to do and we're working right hard on it.

1 - 732 Taking it by sections, you have the radio stations, ETV stations, thinking of the total number that will eventually be developed, I would say we're at one point; we're quite a way along this line. In terms of the utilization of this communications tool we're at another point which is very, very low. Engineering is what I was thinking of, define this a little differently, I think.

V - 733 It's probably at the highest peak.

V - 734 Yes, I suppose 5 here is the transistorized pocket, the three dimensional television set and will last for years and picks up only educational TV!

2 - 735 I have a suggestion to make. In contacts with IRE and other equipment companies, I find a very great change in attitude recently. They are wanting suggestions from educators. They are a little bit worried about their defense contracts; they want to open up new markets; they feel that educational markets can be a primary market instead of a place to dump excess gear. The people we see are the engineering salesmen. We very rarely get in touch with the designing engineers or the production engineers. Some of our relationships with one company only have been very good in this respect, and we have been able to help to improve our equipment. We made suggestions which they've taken seriously and built into equipment. They are accepting crazy ideas about new equipment.

2 - 735 This acceptance and asking for new ideas is not limited to one company. After a speech before the IRE about two years ago I got about 40 letters asking, what can we do in the educational field? How do we latch onto this? When do we begin work? Come to Schenectady or wherever it is, and let's begin designing for you.

1 - 736 We are pursuing several problems, which I can't discuss, along those same lines with industry, and many of them have now taken on educational television people, just to develop the ETV market.

0 - 737 Well this is an interesting note to close on. Some very new developments will bring about a national representation of educators and a national representation of industry design. The prime objective will be to combine what educators think, dream and need, will be engineered to bring onto the market the real subordinate products which I hope will help the educational process. I want to thank you very kindly for your cooperation today. I'm sorry that we'll lose a couple of you early in the morning. The rest of you, I hope, will come back for a couple of hours and we will work on this further. You've been a real help. Thanks a lot.

THURSDAY MORNING SESSION

0 - 738 We're going to go ahead now and start on time. Has anybody hit upon an idea that we should bring up as first order of business? I'm happy with what's coming out of this meeting. A lot of it I recognize as the same old problem or series of problems. At the same time you get a new twist to these every once in a while. I would like to go to #25 because I think one of the critical areas in this whole business of educational television involves recordings. Tape recorders are being popularized; some institutions are making kinescopes. I think maybe Callihan might review the whole recording setup as supported by NETRC and use that as a kick-off point.

1 - 739 Well, as you probably know, what we've done to date, John, is buy for each of the affiliated stations a videotape recorder. In addition to this we installed one of the recorders in our Ann Arbor duplicating center and are now in the process of asking for additional grants of the same kind for stations which are coming on the air in the future. This probably completes the duplicating facilities at Ann Arbor. I don't think it's necessary to go on reviewing that.

0 - 740 I've had quite a few inquiries concerning operations such as Hagerstown. We're equipped with tape, however. Other operations that don't have broadcast facilities wonder how they might some way qualify under this arrangement (for a tape recorder).

1 - 741 According to the terms of the grant, as given to us, a station, an organization, an institution cannot qualify unless they are the broadcast licensees of an open circuit unit. Now, this has been a real problem for us. As you can imagine we have had requests from all over the United States from colleges, universities and school systems. They can actually meet all the qualifications except that one of being on the air with a broadcast station.

0 - 742 Do you think that problem is going to be reconsidered?

1 - 743 It can't be by us. It might be by some other organization. But you must remember that we're primarily a broadcast organization.

0 - 744 We don't have anybody here from Ampex; I have wondered if the Penn State, the Hagerstown, the San Diego State College, etc., if they would go together and get a group of 15 or 20, whether or not Ampex would make them a special price deal. Is there any possibility?

V - 745 No.

2 - 746 They just introduced to us a 10% discount which is fairly new.

11 - 747 That's all you can do, I think.

4 - 748 RCA has a lease that excited us and it was quite something, but it didn't last very long. I think it was about two months from the time that they mentioned it to us 'til we found it was no longer available; we couldn't move on it in that time.

6 - 749 Incidentally, we have the problem of transferring information from tape to film. The Ampex man told us that some other concern on the coast had the problem solved, that Ampex didn't know exactly how it was being done but that they were working on it.

0 - 750 Yes, that is done at a number of places.

6 - 751 I mean with high quality.

3 - 752 They don't use the term kinescope on the coast; it's film transfer.

4 - 752 In the days when we first received television there were kinescopes from in the east coast, and so many people would come out from the east and say, "Is this your TV picture? Is this what's being sold out here? What an image!" People on the west coast didn't know until they saw a live show; then they were very unhappy with it (kinescopes).

1 - 754 John, to go back to your question about the banning together of several organizations to approach Ampex, I would address any correspondence relative to this to Tom Merson directly, and just lay it open to him.

0 - 755 Well, a good many of these closed circuit operations would like to explore the possibility of working out something on tape. I'm not in a position to organize them and have no desire to, as a matter of fact.

11 - 756 Well, there's a possibility, I think, that both Ampex and RCA will come out with additional models. They're working on additional models now. It is possible that there will be more economical models as we go along. They feel that the professional standards have to be adhered to for professional groups, but we might almost be the equivalent of vidicon as compared with image orth cost wise and so forth.

4 - 757 Well, I don't suppose that I should quote Russ Ide on this, but it seemed to me that at luncheon yesterday this question was raised and Russ said that he thought that that was five years away.

8 - 758 Does anyone know anything about the Japanese model that they have supposedly shown?

7 - 759 I heard a paper that was given at the SMPTE Convention the first week in May. The machine does apparently work. A motion picture of a demonstration of the tape recorder was shown. A very poor film of the machine in operation and it did work. The scientist giving the paper was very reluctant to describe many aspects of its operation and refused to discuss deliveries, when it would be on the market and this kind of thing, so I don't know anything in terms of its availability for use.

1 - 760 But they have done this?

V - 761 Yes, prototype machine.

7 - 762 The pilot run is supposed to be in production now.

8 - 763 About a week or ten days ago, two weeks maybe, I got the feeling it was possibly quite imminent that they might very well become available very soon, somewhere in the neighborhood of $10,000 to $15,000.

V - 764 $19,500.

8 - 765 $19,500, well, anyway . . .

1 - 766 Fred, this is direct transfer without the use of tubes?

7 - 767 No, this tape machine uses one head instead of four.

6 - 768 The tape goes around in a spiral.

V - 769 Same type of recording?

6 - 770 Yes, magnetic.

7 - 771 But there are very difficult problems associated with that process just as with the four headed recorder. In other words, it's no cure-all. It has a number of advantages, but also it has a number of faults.

1 - 772 What did you think of quality, Fred?

7 - 773 There was no way to judge it simply because they had no material which demonstrated that well.

V - 774 It introduces another problem of compatibility.

7 - 775 Yes. It would indeed.

8 - 776 Have you heard anything about the CBS Lab. development?

10 - 777 Well I heard one thing. I don't know whether I ought to quote it, but when a visitor was out at the campus not quite a year ago now, he said that they were working on a tape system. The one thing that he did say specifically was, that so far as tape costs were concerned, they would not be any more than 10% as high as they now are in this system they're working on. It was implied, but I think not directly stated, that there would be some considerable reductions insofar as other equipment costs were concerned too. The actual tape cost would be no more than 10% and he even thought that that was a pretty unreliable figure - too high even.

0 - 778 What about the GE process? Anyone want to make any comments? They're very careful about the information they have. I talked to two or three GE engineers and I tried to get all the information I could, but I didn't get much.

V - 799 Did you get a price on it?

0 - 780 No, the price was even more blurred. Probably not anything as cheap as present videotape. Are kinescopes still standing on their own? Is there still an exchange among NETRC of kinescope recordings? Still contracting for film services?

1 - 781 Yes, and as Fred has already pointed out, ABC is doing a number of kinescope recordings now. Actually didn't you say, Fred, more kinescope than previously?

7 - 782 CBS is doing more than previously.

0 - 783 I wonder if we could have a quick answer to page 15? How is the audience attracted and held? Do you have any answers to that? Is the facility going for want? Is there anything in equipment we can improve on? We talked a little bit yesterday about fancy operations, corner inserts etc. Is this helpful to the ordinary operator? I'm thinking from the standpoint of audience appeal or student reaction or whatever you might call it. Does anyone want to give an opinion?

7 - 784 Well, a reasonably interesting picture never does any harm. There's no question on that.

11 - 785 I don't think that gadgetry helps much, but I think you've got to have good quality, presentation and good quality picture. The better the show, the better the chance for getting an audience and holding it. There are a number of components that go into the show. Split screen and things like that are really essential to production. For example, at Illinois the meters and the electrical engineering places are on one part of the campus and some of the things they might want to explain are in a wholly different part of the campus. You can bring the two parts of the campus together on a split screen, for example. The simple things like that, I think, are essential. All the dramatic tricks of the networks and agencies I don't think are essential.

10 - 786 It seems to me there was some promise in that study that come out of the Wisconsin Television Lab. I think it was their report #9, the factor analysis. Do you remember that one, Ray?

2 - 787 Not in detail.

10 - 788 Well, I read it through a couple of times and I don't begin to understand all of it. The idea was, let's see if we can identify the common factors in program appeal. Then in audience building it will be much easier either to make a transition from one sort of an appeal to another as you stack up programs (say in an evening broadcast) or it will be easier to block out an appeal area. A certain factor which is going to be hit here, and to keep with that, have reasonable guarantees that you will maintain this steady audience - perhaps even in building audience there. Certainly the one study doesn't answer too many questions, but yet it was an interesting approach to the problem of how one builds audiences for educational broadcasting. They began with a list of 70 some odd, I think, TV program types, and through survey methods, got responses of people, indication of the feel of these various types of programs used was everything from the Godfrey type show

10 - 788 to the western, to the you name it was listed there. They were trying to see how these things group themselves. To what extent does the western appeal to the man who likes the Ed Murrow? What mistakes are you making? Let's say if you put the Murrow type program right next to some other sort, the feeling being that some of these things would appeal to the same group of people or people with similar interests. Others would appeal to different parts of interest and through the research procedures they had, I think, there was promise of beginning to unearth this matter of appeal and factors in appeal. The only thing I can say beyond that is look at their report #9 from the National Television Lab.

12 - 789 Who did that?

V - 790 I think it's Westley and Barrow; Bruce H. Westley and Lionel C. Barrow, Jr.

2 - 791 Where you put simple-minded things in the area of broadcast, I think we need to do more to let the audience know what is on when. The commercial programs are much more careful in detail in their schedules than most educators are. Another extension of that is using radio where you've got radio and television to itself to alert audiences of programs coming on, in other words, use the medium to promote.

8 - 792 Do your own promoting!

1 - 793 I think there's a wide area that should be investigated too, in terms of vertical and horizontal program patterns. Certainly the networks have done a great deal of research in this area. Our research, I think, should be from a little different point of view, but it certainly is needed for educational television.

2 - 794 Now in the closed circuit realm you also have the question of capturing an audience, but it's a much more tricky business. I mean, here the problem of capturing the audience is getting the department, or the people who are responsible for those large lump section courses, to go on television. We play this in a very low key. Now usually, with Greenhill's diplomacy, he simply chats with the people who are in key positions in the departments. The other week we didn't know whether Math 41, which is analytical geometry, would be on next year or not. We went over and talked to some of the math people and they said, "Sure, why not?" I mean, we had them set it up, but forgot about it. There are two sections, two hours of 250 students each in analytical geometry. One professor is going all out with a group of assistants and somebody just had to call it to their attention and set it up. This kind of network of suggestion and working with departments, where it's quite obvious they need to use this kind of way of capturing an audience. While I'm on that point, our systems are not now saturated but we're not going out with a heavy pressured campaign to saturate them, as we've got capacity and time we're not using. Our gamble is that next year and the year following we will have over demands

2 - 794 on our system, as the need has to come before you fully utilize your capacity. We don't care to go ahead and promote at this particular time. Let the need and the merit determine the scope of the operation.

3 - 795 Sandich, who used to work at the University of Illinois broadcast, came up with a statement I think is very wise, and those of you who have been in non-commercial broadcasting find that (think about this awhile) the educator feels that his job is done once he has broadcast a program. Indications are that maybe there has never been enough promotion to carry this thing through after you have done all the work up to this point that broadcasters panacea and will do the job for you. But the one thing we are talking about here this morning (you must call attention to this), I don't care if it's closed circuit, or what your're doing in the paper or how you do it, to let people know what this is about, that they can get it or not, but promotion is an important factor in this whole thing.

4 - 796 You' talking about the follow-through after the broadcast?

3 - 797 We, in our approach, feel that what we do is insignificant. But what is done in the classroom and the follow through and, from the classroom point of view (when it's an in-school broadcast), that the teacher's attitude and enthusiasm are more important than anything we have to offer regardless of how wonderful we may think it is. On open circuit broadcasting, we do a great deal of promotion, as Pat knows. We have bus cards; we take advantage of everything; we have the banks' cooperation; we do the printing and put these things in the mail for them. They put out about 5,000 a month. Billboards, all the papers, TV Guide and anything we can get our name in and what we are doing, including the in-school broadcasts, for which, on open circuit, we have an audience.

11 - 798 There are two things, one with regard to promotion and the other with regard to scheduling and I can say very briefly. One, I think that a lot of people who criticize education for not adequately promoting its offerings, forget that within the framework of education, it has traditionally been the concept that people come to school and you don't just promote the students; except in certain types of schools. But it is so contradictory to the concept of public education where, what your job is, as a department head and as the rest of this, you do want a certain number of people, of course, but students enroll and come in and it's the job of the registrar's office and the various other departments to do this. So I'm not excusing it but I'm saying it doesn't require a lot of reorientation and thinking on the part of educators, to say that they have a promotional responsibility. That's one thing. The other one is on scheduling, which Pat touched on here, the horizontal-vertical thing. In a closed circuit setup, you don't have the leeway; I mean you have to do these things to correspond with schedules. You have to do that to a certain extent in open circuit too, but I have seen on a certain lot of stations, such an alternation of elementary algebra,

11 - 798 followed by a so-called adult education program, followed by a certain something else which are such wholly different audiences on a single night that I do believe that there is a possibility of considerable improvement in the scheduling area of open circuit. This would give the viewer --say, a public affairs program or something else he's interested in, rather than having to remember all these programs exactly one by one. That is the other problem, of course, to ttain people to use television the way you use a bus, like consulting the schedule, marking the fact that you've got to listen at 8:30. Maybe that's the only time that whole night you'll go to this station. That's a rough one and I think it can be helped by the suggestion that Pat made a little while ago.

10 - 799 This is a question area too, that this Wisconsin study is directed at, and I think that it is extremely good and there is a lot more than can be added here. But it seems to me that there's real failure if the person will begin to study carefully audience building.

6 - 800 I think that is one of the important things in the operation of an open circuit educational television station. You have to go out and get an audience.

4 - 801 Our problem isn't that far removed from the commercial.

6 - 802 Another problem is the financial one which is tied in with the type of service rendered. Educational stations originate a much larger percentage of their programs than do network commercial stations and production is expensive. Most state supported institutions operating television stations have to go to the legislature periodically for funds. For individual stations there's the question of using taxpayer's money from the whole state to serve only a limited area. Also, whether one admits it or not, legislators are apt to compare educational station programs with the best the commercials have to offer in the entertainment field. The results sometimes are apt to be negative unless we can come up with a pretty high grade service. I think it can be done but I don't know the formula without spending very large amounts of money for production.

4 - 802 We have a tremendous precedent set too, don't we, because by and large, we have an intelligent audience and these people have a great many interests.

1 - 804 This is the point that I wanted to raise. It's about how is the audience captured and held? You could get a great deal of argument from several people in the field about the fact, relating to the fact that whether or not there is an audience for educational television. Several people hold that there is a number of audiences having specific needs and desires. I would like to note at this point that Wilbur Schramm is now about ready to publish a book. Actually, it will be out the latter part of October; "The Impact of Educational Television" I believe; I have one chapter on it here, The Content of Educational Television. One chapter is on the audience for educational television. And the things that he points out are quite significant. It is all, of course, in terms of open circuit broadcasting, but I think it has a great deal of application for us.

12 - 805 We've had a fair amount of success, I think, in getting at least the community aware of the fact that there is a Ch. 6 in our community, by working with advisory committees in setting up a great number of our programs. We encourage the people, by word of mouth and general education techniques, to suggest programs, a series of programs that they would like to see. Then we sit down with them and we have, oh, we've worked with as many as 40 or 50 advisory groups. But these people go out, once they have come in and sat down and talked over the kinds of programs they would like to see come over the station. They become, serve as emissaries out over the community and then they say (it isn't a question of watching the KRMA programs), watch our programs and they have a kind of a dire interest in this thing. We have developed, with this, what we said we wanted. This is the way we told them we wanted it done and this is beginning to go out into the highways and by-ways in a very effective way. As a result of this, we've noticed it in the audience reaction we're getting.

11 - 806 One point with which I would quarrel on the technique that educational stations are using for promotion, I think, is an inclination for education to talk to itself and to educated people. I have asked a number of stations, where are you promoting these things? Well, they're promoting them with the PTA, they're promoting them with League of Women Voters, and the AAUW and such organizations like that. Well, there are about 90% of the people who say television is an instrument of entertainment. They don't want any education from it. How are you going to reach those people? Because it happens that we are reaching principally only educated people and those who need it most are least interested or get to it least! It seems to be that a great opportunity is being missed by not involving--I don't know, I don't want to insult anybody here, maybe some of you are members of Moose Clubs and Elk Clubs and American Legions and groups of that sort. The labor groups usually have enough leadership that they can be involved too, but it seems to me that they're the type of organization that need involving that is generally not being involved. Namely, the organization of the relatively uneducated group

11 - 806 and I would not ignore, anything from Moose Clubs to country clubs in this thing. I think if you look at the organization, people are saying there's no point in going to this and this and this group. So they check about a half a dozen of the organizations in the community which are already the groups of leaders. So we continue to batter over the head the tiny groups and we miss completely, that big broad group. I really think that you've got to design promotion, you've got to go out into such organizations, request permission to present talks and things of that sort or get people in the organization. For example, Schooley recently joined the Moose Club down there (Champaign, Illinois). Well, once you get people into these organizations there is a chance to do it, because there are millions of people in this type of group that you've got to keep in mind.

6 - 807 I think you have to go farther. You have to design your program schedules so that you can back up this promotion.

11 - 808 That's what I'm saying. I'm not talking about promotion only; I'm talking about schedules.

6 - 809 Regardless of the fact that we are talking about serving selective audiences, we should do what you suggest and I'm all for it 100%. We have to have programs that appeal to these groups too.

0 - 810 Pat, I wonder if you could wrap up this subject.

1 - 811 I think we're in an area catering to educational television and we have spent millions of dollars, our president has said, on producing programs, but very little money on the utilization of these programs. This goes right back to the thing that Harry and Jerry are saying - that there's a large audience out there that we're not getting information to. Study groups, and Civil War Round Tables and these kinds of people, I think, are other fertile areas for research and we are trying to do something.

4 - 812 Programming to their specific wants even one time might bring them in two more times.

11 - 813 All of them have child problems. All of the women become pregnant, I mean. You're thinking of child care and things of this sort. But you don't have to look for high sounding programs. There are things that are justifiable; well, this is the function of education.

12 - 814 This is a very good example. I was about to say you don't have to use the organized clubs such as the Moose and the Knights and so on. But we find, you can bring in unorganized groups. You mentioned this pregnant woman business and we have a series we're starting in the fall, "Prenatal Care of Mothers." Well, I guess they're organized, I don't know, but we didn't go

12 - 814 to them because they're organized. We simply got people from around the community and said,"You've asked or suggested this kind of a program; what do you think it should have in it?" Of course on the committee there were a couple of doctors along the road, a couple of clergy and so on and so on, but when this thing finally comes out, it's going out under the name of a committee, not under the name of Opportunity School, or the station, or Denver Public Schools or anybody else. This committee is the producing body.

4 - 815 Where you can, affiliate organizations in a town in cooperation, in conjunction, with this kind of thing.

2 - 816 Let me give you a concrete problem and see what you would do about it. We have a cable system which is connected to about 800 homes. Now language instruction over television is something we're interested in experimenting with and so on. We surveyed these 800 homes for what language course they would want. What came up? 40 for French, 60 for German, 20 for Spanish. Now this is a microscopic number, but here, what course are you going to put on? Now there are 120 people interested in language during meals. This family learning of language idea. But are you going to use German, French or Spanish?

12 - 817 Some of them are interested in French, some of them are interested in Spanish, a few are interested in Italian. So we had a group of about 40 people come in, spotted geographically around the city and we said "Now this is the problem some of you have said this and some of you have said this. We can only teach one. We can only do one language. What do you recommend?" Well, the French people, the proponents of the French language said, "Will you some time teach French?" And our agreement with them was, yes. After we start, get the Spanish going, get it on the road, we will go to French. They agreed because there were more requests for the Spanish. "We'll ride the thing if we have your assurance you'll eventually give us French," they said and there wasn't any pain about it at all. But this same group of people is still talking about our language program.

11 - 818 Sure and all three groups become promoters for any one of the languages.

0 - 819 Let's switch back to in-school television.

14 - 820 Is there some sort of psychological factor here which has to be considered with reference to the size of a class you can capture and hold? For instance, is it simpler to hold a class of twenty than a class of 300 in a viewing group?

2 - 821 Our students prefer the smaller classroom.

14 - 822 Well, I don't mean what they prefer. What are the factors? Can it be a factor with a couple hundred at a time?

2 - 823 Well, I don't think there's measureable differences if you've got the proper situation for the large class. Adequate number of receivers properly placed, proper environmental conditions in light, etc. and I think you can measure differences in relation. This is the way I express it, there is no different correlation between the number of people who are assembled and the learning of those people, other things being equal.

3 - 824 In other words, if you have 10 rooms with 10 people each with 10 sets or one big room with 100 people and 10 sets.

2 - 825 Other things being equal.

3 - 826 Each 10 to a set regardless, right?

2 - 827 Other things being equal. Now they will prefer the ten to the set.

3 - 828 You mean 10 to the room?

2 - 829 10 to the room.

4 - 830 This, however, is an argument so many faculty members are using, to say, "Well why television?" If you don't split them up into small classes, they might as well be in a large auditorium listening to me. I can shout and you can give me a PA system and you can turn the lights on me and I do have my relationship with the class.

3 - 831 You have a one to one relationship via the monitor.

4 - 832 That's right.

3 - 833 Yes, but he doesn't. Really and truly he does not have the same relationship in person as he has via TV.

0 - 834 I'd like to move this conversation over just a bit to the point of origination. I have heard, seen and experienced the classroom origination and the studio origination. There seems to be two ideas, both of them quite popular. One being, move the equipment down the hall into the normal classroom situation. It becomes a studio for the moment, versus the other - the Hagerstown TV Center idea. I'm sure most of you have given this some thought. I would like to have some reactions.

3 - 835 Gagen of New York City wrote a particular approach to this. He drew a fine line between televised education and instructional television.

11 - 836 I'll give you my reaction real quickly. I prefer the setup you have here, except in the case of certain laboratory equipment where you've got fixed equipment and there's an advantage to moving the equipment in. But even in those cases I think you should keep students and others to a minimum, in the sense that I do not believe in having a bunch of students sitting around watching the professors visually because you introduce too much distraction on the part of the TV students and so I think it begins to destroy this relationship at some point. He no longer has eye contact with the television audience. He becomes distracted as well as the audience.

2 - 837 Well, could one be a bit flexible here? We started out you know by simply mounting cameras on a high hat in the audience and this is the image that's in today's project that still persists. I mean, many people think we're still doing that. As a matter of fact, let's be flexible in terms of doing this when it can be justified. For example, last semester in the history course where we had two very distinguished professors, they wanted this large class. This was the first time they had been on television and this is the only way they would do it. So you play ball with them. Now what happens next semester? He'll say, "Well, let's get this big class out now, I want a few people in the studio." So you play ball with him. Then the next semester he'll say, "I've got to concentrate on this camera. Get the students out of here."

4 - 838 One of the most effective things that has happened to us in Harvey White, who, of course, has done well by coming out flatly in stating that the last thing he needs to worry about any more in working television is the student reaction. This was a big point that everyone was saying, "I've got to have it; if I don't have the student reaction, I'm not going to be able to pitch my remarks properly." And with quite leading, flat remarks, it would save time; it was better; you had a cleaner lecture; you didn't have to worry about that at all. He had to discover that. He has a big enough name to make a real dent in our school.

0 - 839 You've got the human element all the way down the line, and I think all of us have experienced a similar thing. We started off with the fact that the teachers felt that they needed this contact with students; then later they said, "No, we don't care for the students in the studio." We've got a new situation which has a little significance. A teacher who had started in the project a couple of years ago thought it might be wise to go back one day a week to meet a classroom situation, to recheck pacing and reaction, etc. The reaction is this, "I can't do the things in the classroom that I can do on television. I am a far better teacher in front of a camera."

2 - 840 Well, you see, you need this feed back. Even Harvey White has feed back, but he's accumulated it over 20 - 30 years. If he didn't know these kids he'd have a very different kind of a program. There are different ways of getting this. For example, you can have your audience there (and I think generally this is desirable), or you can have the teacher who teaches on television and also has a small section. We find this extremely good for two hours on television and one hour or two hours on problem solving.

0 - 841 Well, is it safe for us to recommend, in the main, that you go to a studio setup, and relegate the classroom for the situation of the extra special origination which is rather infrequent?

2 - 842 Well, I'd like the principle of variability to take place here. Don't specify any one pattern; work out the best one for the situation. Then there's another overall concern that I have here. You have the TV center, you have the dispersal pattern too in contrast to this. We're committed at the moment to the dispersal pattern; we're not building a big TV center. We're putting television into buildings where it can be justified, and most of our new buildings are being planned with this in mind. Now is this going to break our backs? For example, what would you lose or gain in Hagerstown if, for instance, in certain of your courses - music, science, etc., you picked these up somewhere else on your cable. I mean, there may be situations where this can be done.

4 - 843 I'd be interested in cost efficiency.

0 - 844 There's the angle. Is the service rendered worth the cost? We had a similar plan or desire for mobile units. Put a studio aboard a van with a tape recorder. That would be the most versatile thing we could think of. But when we start thinking in terms of manning this van and if you don't use it a lot it isn't worth it. As soon as it hits the road you've got to double the personnel and start to duplicate equipment. The only solution is to turn to the educator and say, now look, this is the way you can do this and this is what it's going to cost. Can you justify ownership?

4 - 845 We were thinking in terms of a mobile truck and it looked for a while like we might get it, and in the last analysis they asked us to go to the stations in town (I picked the two in town because I thought that we could get a pretty good answer back) and they, both stations, came out within $25 of each other. It cost them $400 to take it out of the garage and when they came up with that figure our administration made a decision.

2 - 846 Well, we'll operate on a different system in education, and incidentally this discussion has two very important implications for your report. One is when you begin to talk about studios. Yesterday we were thinking about centralized studios. Now you're up against a different problem. When you decentralize, when you've got a system in different parts of the university or different parts of the community, and what do you need to centralize, what can you disperse? For example, in videotape, it's highly probable that we will never locate that in any one spot. We've got to have mobility because of the multiple purposes for which we are going to use videotape in the university. So we can't think of a videotape room that's air-conditioned where this thing's going to be all the time. We've got to tie this in with some kind of mobility. I think Illinois has.

4 - 847 Dick Lewis at San Jose State has some excellent information on the use of mobile trucks. No videotape; teacher observation particularly.

2 - 848 Well, with your compact unit, you don't have to have a big van as a lot of the commercial stations do. They've got an old surplus army radar trailer and it works beautifully.

1 - 849 John, to go back to your question and Ray's answer. I think that Penn State is going the way of most of the big universities. They are wiring the new buildings for television. I think that the idea of mobility, in this sense, has more application in a university setup than it would in a public school institution.

4 - 850 The mobility here is going from one school to another.

11 - 851 Well, in any university, traditionally, you have a sort of a physics center, I mean, you have your science building. You have your various things. You can't move them into a studio. The equipment in the demonstration is very often the most important part of the thing; naturally it would be.

4 - 852 We ran across, I don't think too curious a thing, but it's again the matter of educating the instructor. When we start out, we can have the loop all the way around the campus. We can go most any place. They'll start out saying, "Let me have this remote. I don't want to come into the studio. I want to do it in my own surroundings." Then you move these things in on them and they have all this trouble getting things squared away and so forth. Then they'll say, "Next time probably - well gee - I think it might be easier if I loaded up a truck with my things and came over to the studio."

0 - 853 That's usually what happens here. We have the facility for originating outside the studio but you consider the man hours and the lack of flexibility when you get there. In any case, if it's practical, we bring it to the studio. It's a lot easier. Now, I'd like to try something else.

7 - 854 Can I make one brief comment on the things Pat mentioned, namely, the problem of equipping new buildings adequately for future television use? I notice that the Association of University Architects has started to investigate the problem. Michigan State, I think, has something in writing already. Illinois had a committee studying this problem, and we're, I think, in the process of forming such a committee at Michigan. In any case some liaison with this architectural group, a group of university architects, would be desirable. Admittedly members are (I think at most institutions) supervising architects and men that draw the working drawings. I don't know on our campus what the architect is calling for, in building specifications, and I think this is an important thing at the university level. Is [illegible]

0 - 855 I think that a committee drawn from the people, such as the type of people we have here, has two obligations in terms of engineering and in program planning. That is, to work with architects on all public buildings, all school buildings, all institutional buildings, toward making common recommendations for future facilities. I think, likewise, another committee, perhaps some of the same committee, should work with Electronic Industries Assn. which recently has established a committee for just the thing we were talking about yesterday. That is to select a person who will serve as liaison between producer and consumer. In this case educators dreaming, thinking and planning - and engineers designing for their needs.

1 - 856 John, I would like to emphasize your statement by just saying that this shouldn't be limited to engineering guidance and advice. It should also include production people, who have to think in terms of lighting facilities and the rest in the design of new buildings. The entire program really. Perhaps lighting is the least thought of in terms of architectural drawing.

0 - 857 Well, I find we are moving right into this lighting situation. I'd like to hear any comments in terms of receiving areas, classroom lighting, etc. That is an area that's critical, really. Do any of you have solutions to the lighting problems in the classrooms? We have a very serious problem. Newer buildings are frequently glass wall types which have extremely high light pickup from outside. It is uncontrollable. You cannot have the window without light coming through it. If you cover it to where the light doesn't come through, you don't have your window any more. It costs a lot of money to put the glass wall in and then you have to turn right around and increase the cost by putting a cover over it and you've a ventilation problem etc. I've worked with the architects and tried to

0 - 857 present the problem. The architect says, "I see your problem and I know your problem, but I am working with the school board and this is what they want."

11 - 858 This magazine, this publication that came out, I believe it was done by the Educational Facilities Labs., misses the problem, not only from the point of view of educational television but the use of audio-visual aids. There's much glass in all those buildings but you're talking about a room, aren't you, that's used constantly for this? What about the adaptability of all rooms?

3 - 859 There's a study now underway in Phoenix. They had two schools built in Phoenix without windows. Artificial light, artificial heat, and everything - air conditioning!

V - 860 This is started now; they have found that this is a more economical structure and it costs less to operate.

0 - 861 You still have the inside light which is nearly as great a problem. Now, again, we need to have some kind of liaison - educators, television people, who are committee-wise working with lighting designers. I have worked with Nela Park people but have achieved nothing. We have various kinds of lighting in our new schools; I have yet to find one that I think is the answer. It seems like indirect lighting is the way to do it. You can bring your room lighting up to a fairly high level and still not have bare fixtures exposed. If any of you have had any experience along this line in working with building people, in planning or even in thinking, I would like to hear about it.

2 - 862 The way we've done is to hood the screens. Attach a piece of beaver board or some kind of a composition board on front of the screen. It flips back or it flips forward. With a slight curve on it, it'll knock out the reflection that's on your screen. Where you have hanging fixtures, you can change them. Another thing we've done in working with our building people is try to get flush fixtures instead of hanging fixtures. These things that are projecting down, especially when you get them on rods or cords, become an awful nuisance.

10 - 863 They tilt it forward about 10 degrees too. Tilt the set forward and have it with the picture centered about six feet above the floor and these things all will tend to help, but there's not any of them a complete solution.

2 - 864 The set should be on a tilting surface and your TV stand should be so that it can be varied in tilting. Another problem that we run into is that you bring your cables into a room and the building people, out of economy and law of least effort operating, will put them on the hall side of your classroom and then when you go into that building you've got to find someway of getting your outlet over on the window side bncause your

2 - 864 TV set has to be on the window side. These are just the elementary things.

4 - 865 I think Spencer-Kennedy Labs. out of Boston, has done some work on this, and I know their program is being published, but I haven't seen it. I know they've given a great deal of thought to this kind of wiring to the school in terms of windows and best receiver etc.

11 - 866 This type of publication must be done with a relatively large number of consultants who are involved in education, educational television, audio-visual work, learning machines and the other types of activities of this kind. It is not the kind of a study one can do in an office; rather it is something which requires a lot of field work, testing, sampling and checking. Architects should be aware of the problems associated with large glass window areas and design toward reducing this problem of light. Some of the new room shapes and designs are good; they suggest flexibility and things of this sort. People from various areas that have had an opportunity to observe these problems can contribute much toward recommending methods of obtaining the advantages of new designs without the obvious disadvantages which are learned only through checking and field testing. The Office of Education might be one good source for such people with information of this kind. The architects must know these things.

1 - 867 I think there is another way in which we might get at this problem. Most of the schools and universities and teachers colleges have courses in school transplanting. If we're talking about what should be, then there should be a way that a television group can establish a liaison with the members that teach the school transplanting course at the universities and colleges because this is where you start to establish the honor in the minds of the educators.

0 - 868 EIA, too, is another good contact.

6 - 869 Would it help to get manufacturers of television receivers to produce them with higher light intensity kinescope screens?

0 - 870 That has its limitations too, of course, but it's another angle to work.

2 - 871 John, I think the report ought to make reference to a study which is being supported by the Educational Facilities Lab. at Rensselaer Institute. Now they had their first meeting of two intensive days with Makehomer, Omstack from Texas, and I was there. I don't know why we three were selected, but, nevertheless, we were with some very top notch representatives from big architectural firms who are doing school buildings, plus the people at Rensselaer. There are five or six very good men there who are intensely interested in this. Now, they're asking this

2 - 871 question, what would a university, and more specifically a college of engineering look like, if the entire facility were designed with the idea of making maximum use of any of the instrumentation for teaching which exists today? You can talk all you want to about brain storm sessions, but this was a very profitable type of brain storming session. They have a staff assigned to the project. After this first meeting they will draft a preliminary report. We meet back again at Rensselaer on the 6th and 7th of October and they continue to work. I mean they're forgetting what exists and are trying to raise the question. And this ought to be referred to in this report. Contact Dean Hauf. I don't remember his initials, but he is Dean Hauf of the Art and Architectural Department at Rensselaer.

0 - 872 Very good. Does anybody know of any other activities or studies that are going on that might be of significance?

4 - 873 What is being done in the area of acoustics?

2 - 874 It is such a fantastic job that it's difficult to approach it. But I'm sure that within six months someone is going to get up another study group on the acoustical problems in schools and so on.

0 - 875 Just to give you an accounting of this whole thing that we're talking about, it's environmental conditions in the classroom. We had a situation in a classroom where we had the outside light problem and went to a fiber glass type covering on the window. It did something for the acoustics, it did something psychologically for that room, it helped the control of light, and in checking back with the teacher she said she wouldn't part with those. We could take the desk, we could take everything but can't take those curtains. She said this has done something to this classroom she couldn't explain - - it gives sort of a domestic atmosphere and plain personal comfort. I was much concerned about the physical lighting in the viewing rooms. I think it's even true of the ordinary classroom without television, but as soon as you put in television I am concerned from the standpoint of what I can do with the picture. All these run into a good atmosphere for a good learning situation. The acoustics, the light control, all of these add up to a better learning atmosphere.

11 - 876 Has anyone given any consideration to floor treatment? We always have talked about ceiling treatment. Some floors and things are so noisy, and of course in a lot of schools they don't have floor treatment. Here we have a rubber tile, the chair movement and things of that sort which cause extraneous noises and all the rest of it, are also a factor which should be taken into account, particularly at the elementary level. In universities you don't get quite so many rifts of people.

V - 877 Apparently the course is good; it's just that it wears out.

0 - 878 Well some of these people in the physical plants of various institutions can come up with some interesting figures in regard to floor covering. I wish I could recall the exact situation now, but it was the idea of putting down a rug of a kind. The maintenance and so forth that went with it was not really out of line. Economically it is practical to consider a floor treatment which is other than what we'll call conventional.

10 - 879 I was just going to say, we did this little study back at Purdue, put out, in the June or July issue of the SMPTE Journal. That was a take off in the television world, of some of the stuff that Tinker, Lukie and some of them, primarily Tinker, did on legibility. You mentioned the matter of viewing room, the environment and the characteristics to the medium and so on, and this is essentially what was concerned here. The problems of legibility, bar materials transmitted via the medium, arrangements within room and so on. There a person can very readily, I think, take a page from Tinker's book and proceed to a study of legibility and of total viewing environment for television. There's been almost nothing done in this area. We got this Tuft's University handbook of Human Engineering and I don't know how many other sources, and tried to check to see what we could find about the proper establishment of a viewing environment and there just is very little that now exists. The field is wide open, and it turns out also that it is a very easy area to research. I mean that problems of criterion measurements here are not nearly so great as they are when you get into the area of measuring human learning and trying to figure out what is effective learning and what is not. It is relatively simple to identify your criteria and then to proceed to optimize certain conditions and yet there has been so little done in it. I think if somebody were to set up with $100,000 draft, they could, in a very short time, in 18 months, uncover all kinds of answers. We just don't have anything but cut and fit approaches to it right now.

4 - 880 Have you seen the handbook on Human Engineering that the Navy, NEL, Naval Electronics Lab. put out several years ago?

10 - 881 We checked a couple navy publications. One was submarine warfare, I think. It came out in World War II and had to do with radar screens, the brightness levels and so on, viewing demands on radar observes and this plus that little bit of stuff in human engineering, Tuft's University handbook is about all you can find.

0 - 882 Well, some of this information isn't worth much as far as broadcasting is concerned where you have no control over viewing areas, but as I see, in a selfish way, the developments of the Hagerstown-type operation, where you are working into classrooms, public institutions, you do have a lot of control. Here is where I think much can be done for lighting and for the acoustic problem which comes up again and again.

12 - 883 This is excellent information to get out as people put in or build homes with dens and so forth. It would seem to help the economy to good TV viewing.

0 - 884 I'd like to refer to page 19, Table of Organization. It might seem as though this would be an easy job but my experience has shown a wide variety of approaches to the table of organization. I'm not so concerned with who's the top administrator, yet I want some comments.

1 - 885 This is one spot where I must come back to my original point. This definitely, I think, is determined by what your ultimate goal is. If it's general audience broadcast, it's one thing. If it's classroom, I think it's another.

12 - 886 We need to break it down into specific categories.

11 - 887 This one I suggest that you reach is Bob Shenkkan. It's too bad he isn't here this morning. He assembled (called) a group, about 10 of us, who were to have a meeting in Austin, and thanks to Ozark Airline I never got there. I have not seen any report on it. Precisely, it was to be an examination of where possible alternatives, in and what the relationship of the instructional programs are, in the universities to the operational program and all the rest of it. He's already had this meeting, it was a month or so ago and I didn't get to it. If he were here he could have contributed a good deal on this particular item.

0 - 888 Well, I'll certainly check that. I would like (I think we worked on this pretty well yesterday), as a matter of clarification, to talk about a multiple-type person, one who knows four or five different activities. He may be a producer, a director, he's good in photography, he knows staging and lighting and all this. Just how important are these areas? We said the engineer should be one of a certain capacity and capability. Do we need one, two, or three people of this type in production-direction, the arts, graphics, staging, lighting? What is the common denominator?

11 - 889 I think you have to list the skills you need, and leave it to the individual institution to assemble them into whatever bodies are available.

0 - 890 Will this sort of follow again what Pat has said based on the area we're to serve?

4 - 891 That's right. There are so many unique needs. Obviously we can't determine numbers, areas, etc.

11 - 892 Several years ago, some activated operations committee did some work on this hoping that we could come up with a little plan. Recently, in some office correspondence, they asked about this thing. My reply has been, that the diversity is so great, and I'm glad it is, it can't be done. Because out

11 - 892 of this, we're going to learn some lessons, if we can study them and see which ones work best for which kind of organization. Then you can begin to identify a dozen kinds of different type organizations, all of which have certain variants, in which one can learn from another in a similar situation, but I don't think there's any one organization.

1 - 893 I think there is still a great diversity, even in commercial broadcasting, as long as it's been operating, in terms of administrative and staff functions.

12 - 894 Another thing that will control the organization is the licensee, the person who owns and operates the station. This will make quite a bit of difference.

0 - 895 Institutional policy? One other thought is this. When you're thinking of the activity of educational broadcasting or television, is there a place in the institution it should go, such as the speech department, the radio journalism department, etc.? Is there a likely place for activities or is this still an institutional policy? I'm sure you've made this observation. One institution has TV under the wraps of engineering, so it's well engineered; another place - its under the school of education and its good education; you go to another institution and its another department. The department influences much what is done. I'm not opposed to it, but what's the reaction of this group?

10 - 896 One or two personalities within an institution make all the difference in the world. How it happens, I think, is a good deal of what you are observing. It seems to me to be part of the problem of trying to set up the table of organization. People do not come in standard units, and you have a certain slot identified here, but nobody comes along to represent the temperament and capabilities that the slot requires.

4 - 897 We ought to be in kind of a reverse and that is, basically, what areas are we doing fairly good jobs commonly, and in what areas do we seem not to be doing the job - where we ought to look at the organization. Where are we weak? We've already hit one which is lighting!

1 - 898 Let me try another approach. Let's go back to the thing we said yesterday when we stated that television is primarily a service organization. If this is true, then maybe there is some kind of a common denominator that we can find for establishing a unit as a service agency within a broad frame work, and then this, the administrative structure of this, might be spelled out.

2 - 899 I'd like to suggest the parallel here is a library. If we do the job that we should do, we should be somewhat in the same bracket and perceived as a library is perceived by doing the different function. It's more of a divisional organization. That is, we risk being too closely identified with speech, drama, education, or anything. We are an organization of our own.

II - 900 I might give you an example of the type of thing that can happen. As you know, radio - television and other such services are usually subsumed within a department on a university campus. The department head serves as the administrator of the unit. The policies are usually established by a governing body of the institution, the president or perhaps the board of trustees. At any rate, the personnel employed or sharing services with the radio -television unit, are basically from a department (the news director from the journalism staff, the director of educational programs a professor of education etc.). Some exceptional students are given experience in announcing, casting, production and other activities related to the organization and operation of the media. Some universities put the administration of the media into the office of public information, public relations, assistant to the president's office, or some such area. This severed the connection with the department to which the radio -television activities had been attached. Personnel on the radio -television staff no longer had academic class responsibilities but were essentially professional staff members. All of this seems to be good planning. The problems arose when it came budget time. Whereas the radio -television department had been receiving services from people not entirely budgeted against the operation of radio-television, it made a substantial difference when these supports were withdrawn and the budget had to be met for the professional staff. This carries over now to the areas we are discussing. Television should be a part and parcel of as many institutional departments and functions as can be planned in order to spread the functions and costs over as wide an area within the institution as is possible. This also involves many departmental people to help promote and utilize television.

4 - 901 That is exactly the experience we have had.

II - 902 If they are involved in the program, you have their support.

4 - 903 It's five or six departments batting for you.

6 - 904 It makes a difference if the activity is in a service or non-academic area or whether it is in an academic department. It becomes difficult to get academic rank for members of a staff in a non-academic area.

0 - 905 This again, this I think falls back to institutional policy pretty much don't you think, Carl? Let's talk about lease versus purchase of equipment. Have any of you had experience along this line or do you have any reaction to it? Most companies will now offer a plan where you

0 - 905 lease equipment top to bottom, pay a fee, and I understand the total purchase price becomes cost plus 5% roughly.

4 - 906 There is absolutely no chance in the State of California except in very isolated cases. Around the state, if we're interested in leasing, if leasing is the answer, and I don't know that it is, but at least from my experience, we need to go to work with our state.

0 - 907 Well, this is institution policy. Is it an activity of this group or a committee from people of this kind? Should there be a liaison between the state legislators and state institutions so that this problem can be helped? I know that many institutions are going out and paying a lot of money for certain facilities, only to retire them in a short time to do a temporary job they really want to do because of financial problems and are unable to buy the right equipment in the first place.

4 - 908 We haven't even got a concept of the used warrenty idea. There's the feeling many places when you buy something used you're buying it old, worn out, tattered.

1 - 909 Before we go into this, is leasing a valid principle?

6 - 910 This, I think, brings up a problem, especially with state supported institutions. The legislature allocates funds on a biennial basis and the institutions can't commit themselves beyond two years.

11 - 911 Yes, but you always have phone service for example, IBM etc. which is leased, but it does create a problem in a business office. Here again, I think the significance of this Galveston Phonescope thing can't easily be over estimated. This is essentially a public utility. You don't buy anything for a hundred dollars a month to equip a classroom. They have cables to connect the rest of this thing. I would think that within the next few years, there is not only going to be this Phonoscope Company which is going to be enermous before it gets through, and it's going to be possible for a school like Hagerstown to set up a whole system just on a lease or rental basis, which is incomparably cheaper. I mean you can - the rates are reasonable.

V - 912 Over the years is it?

11 - 913 I really think so. Eventually we'll have more material on it, but I can hardly believe the extent of the service, which they provide, at the cost.

V - 914 I think this would have to be explained fully to a legislature.

11 - 915 Now this is wholly different from the dilemma you're in, in a closed circuit situation. You consider renting phone lines from the phone company at the rates prevailing as opposed to owning your own. You begin to compare the cost of closed circuit when you get about so big, to the cost of operating say, a UHF station or something else as a more economical distribution system. I think of the small school system, in at least the station situation, (obviously, you're not thinking of leasing stations in most cases) with almost no engineering skill. A lot of the big market area is going to be the small school from now on, I think because a lot of the big schools started closed circuit with owning their own facilities. This Phonoscope thing will probably have facilities in ten times as many schools, as own their own facilities, within the next ten years.

10 - 916 Do they provide maintenance? Provide for obsolesence?

11 - 917 All that. It's really, I say, pretty difficult to overestimate the implications of this for educational television. One of the biggest things to take into account now is the Phonoscope people's philosophy.

0 - 918 I think that - -, this kind of a buying plan or lease plan is going to help this whole activity of educational television enormously. There's no question.

11 - 919 I might add that they provide exactly (its almost an exact counter part of the telephone company) what you expect in service; its a public utility and they provide installation, and repair. It's like when your phone doesn't work, you call for service. If something doesn't work with Phonescope, you call up the same way for service.

2 - 920 We had great difficulty getting the 24" unitized set (Setchel-Carlson).

0 - 921 I would imagine they are custom built when an order is placed. Do you fellows have any particular reports on equipment you want to bring up? For example, one of the things that has become quite popular is the Setchel-Carlson receiver, with a unitized chassis. I think this is an area where people, like us in Hagerstown, profit considerably with a large number of sets in service with the unitized chassis arrangement. There are a number of features that Setchel-Carlson has in unitized construction that makes service easy. Another feature we like, the RCA set, is the fine tuning adjustment, pre-set they call it. Maybe some of you are familiar with it. You tune it once and this eliminates the problem of tuning in the classroom.

4 - 922 We have a batch of Packard-Bell receivers. They said they were run out on bids. Here we go again, but we've had good luck with them.

10 - 923 It sounds like this might be the sort of thing that a group would want to get together with engineers and perhaps recommend to them - that here Setchel-Carlson seems to be moving out of the field of the unitized chassis when others are becoming, well, when the group seems to be getting convinced, that this would be a very proper item to have.

4 - 924 Hoffman came out with a special TV viewer.

3 - 925 John, have you found (one of the things on Setchel-Carlson - we have some) people don't like them for broadcast? We have found all that we have (this is only three or so), trouble on lighting. We have a time getting enough brightness on the picture tube.

0 - 926 I think this is picture tube phosphorus problem.

3 - 927 We've gone to Conrac.

4 - 928 San Jose got a group of Conracs and they were built in special cabinets and so on and they were awfully beautiful things. Dick Lewis told me that, I've forgotten just the price that he quoted, but it was pretty expensive, but it looked like it might be within reason. We called them and they had gone up $300 per unit. They had made a mistake in bookkeeping.

2 - 929 I have one very strong feeling. I get mad every time I go into a school system and see 21" sets. I mean, the difference in the price in relation to the difference in the effect seems to me to argue strongly for 24" sets. Actually I think that the engineers and producers got out of the 27" sets without considering their possibilities in schools. It can be produced. It does require a different circuitry, but I regret the 27" set has not been developed and made a production line item.

12 - 930 27" Conracs are used

1 - 931 Here's another need for contact with manufacturers.

10 - 932 Certainly when we're thinking in terms of 25 to 35 or 40 student groups you're a lot more realistic if you're talking about a minimum 24" and perhaps larger than you are when you start talking about a 21".

0 - 933 This discussion we've got on our hands right now is somewhat in the equipment recommendation area again. What about special equipment, specially-designed equipment such as the classroom models we are seeing on the market? Have any of you used them? Is this a problem when you go to make a purchase, you have to go through the bid process? Is this another institutional policy problem?

8 - 934 We had some special sets at Illinois and the engineering staff wouldn't use them unless we ran out of plain old stock GE models. On the other hand . . .

7 - 935 For what reasons?

8 - 936 They said the guts were just worthless and the guys (the contractor for the local service organization for maintenance on receivers), said the same thing. They'd economized so much on the major circuitry that they were just worthless. On the other hand, this is the receiver selected by the New York system and they think they're great, but I can't agree with them. I don't think they're worth the money they pay.

7 - 937 In terms of physical arrangement they're not too bad are they?

8 - 938 No. It has a wooden cabinet which doesn't dent. They have a lock to lock it up so the controls don't show. They have a baffle enclosure for the loud speakers.

4 - 939 We've had good luck on a kind of an economy for stands. We've gotten a structural steel with holes in it, angle iron. We can very quickly cut pipes in different lengths and get good sized castors. Putting money in castors, we can change these for any situation and we have a guard rail around it and special bar that comes up across the control. They are light, easy to move around, easily adaptable to change and very inexpensive.

12 - 940 John, on this bid thing you can take a little of the bugaboo out of it, I think, if you can get the administrative body, whatever it happens to be, to allow you to set up your own specs. If you have to take the bid just simply because it's the cheapest, of course you're whipped; but if you can put in specs to the administrative agent, the central purchasing office, again whatever it is, whether it's the board of regents, the board of education or purchasing office or whatever, the engineering and production people can set up the specifications and this will eliminate a lot of the mess.

4 - 941 What do you do when you have to get a three (minimum) bid?

V - 942 You've got to loosen them up to get it (break institution policy).

0 - 943 That's a problem again that probably should be handled by a group or area counselors to work toward modification of purchase practices.

4 - 944 They're beginning to understand now.

2 - 945 Before I forget it. Something happened in Pennsylvania and nobody knows why or how it came about, but the general state of authority that finances a tremendous number of buildings, both public schools and colleges, last January approved the purchase of closed circuit TV facilities, not broadcast, as a part of the equipment of a building. Where you have central state authorities financing school facilities, if you can get this body to permit you to buy equipment just as you do blackboards and lighting fixtures you're in business in a way that you couldn't be before. And this is one move you see toward thinking of television as a central . . .

4 - 946 We think this will happen in our state, very quickly.

11 - 947 Lee Dreyfus mentioned to some of us, and you have probably all heard this story about how he couldn't get a color receiver so he finally ended up giving the specifications and ordering one non-monochromatic reception unit. This is a ridiculous thing, this situation.

0 - 948 In trying to summarize our talking we might go back to page 45 and see if there is anything anyone wishes to contribute, either what was expressed improperly or inadequately in regard to these common problems. I think that the best results will come about by eliminating the problems in any operation. Does anyone want to add anything to what's been said in terms of the technical facility? In terms of what is available today on the market,.as to minimum requirements that we should suggest for a specified installation and so forth?

11 - 949 You can't really say. You wouldn't want it on the record but have you found any significant difference between kinds of receivers? For example, our engineering committee convened and helped in the design (Carl knows more about it than I do), of the Motorola receiver which they designed essentially for a classroom thing. I don't know to what extent they incorporated those things, nor how well its worked out. Then Zenith, for example, tried to take into account school needs and things like that. These things should all be off the record.

0 - 950 I think we can talk in terms of what we want to say but let's don't put down brand names. I will say this, I can select sets from most every manufacturer, and given the liberty to select models, I can find very even performance. Now, the problem you run into is, for an example, a $175 set. One manufacturer's may be better than another manufacturer's competively priced model. At another price range, say $225, the situation may be reversed. Different features are displayed often times, in the various lower priced models. Seldom can you find all the desired features on the lower priced sets. Some manufacturers use the same chassis (or nearly so) in all models but vary the audio, the cabinet and a few things like that. So

0 - 950 when you start comparing instruments you have to look at costs.

V - 951 That's the point I was going to make.

4 - 952 Front speakers! Demand front speakers!

2 - 953 What we did was take an extra speaker and mount it in a baffle board under the set, and use a 12" speaker. There's no chance of compromising on sound because here is where much of your information is.

0 - 954 What is the price of these? Price goes up fast when you get these added facilities. A good audio system and console runs into a lot of money. I think it's worth it but it's awfully hard to convince your purchasing agent on things like that.

2 - 955 Yes, but even your speaker, the audio can drive a bigger speaker than is usually put in a set.

0 - 956 Any other comments on this?

2 - 957 Can't you get a little more specific? For example, from one manufacturer we got 12 or 15 sets and they were wired in series, the tubes were wired in series. You know what this means, I don't. Those sets have given us three times as much trouble as any of the others.

0 - 958 Another thing, this is pretty well worked out now, very few of those are on the market (series filaments) now; most of them have gone back to transformer chassis. What about the metal sets? Do you find any difficulties with metal cabinets in terms of hazards?

V - 959 Electric shock.

0 - 960 Now this has raised a legal situation in a place or two and Hagerstown is heavily loaded with metal cabinets.

V - 961 Have you ever had trouble?

0 - 962 We have not; and we don't care for any!

V - 963 Are they all grounded?

0 - 964 We're grounding them.

8 - 965 Locally we run into a lot of problems of this kind, for example, New York insists on three wires. When they order sets, some of these sets will take a special run to get them the way they insist that they be.

0 - 966 Well you see, different areas have different codes. Underwriters Laboratories is working on this problem right now. We talked to a few of the set manufacturers and I don't bother with all the details that go along with it. There are reasons why they are doing what they are. There's the cost, the fact that, normally, the set is not dangerous or likely to cause damage, so long as everything works right, with the right proficiency. So I have not been able to get any real satisfaction. What's going to happen is accept, it seems like the best thing to do, the nonmetalic covers. Have you problems along that line? What about adding to the staff arrangement what we have not said?

1 - 967 I'd like to reemphasize one point we made earlier which I point out in regard to the studio a moment ago about relating staff to environment. I realize you have a serious labor problem. This is not a comment on your operation but an example that was given in one of the studios in which there were three students involved. They were laughing and joking and obviously having a good time, which is fine for youngsters. But my point is, communications is a very serious business, you can't laugh and joke in studios; keep is serious, then I don't think you are endangering environmental surroundings.

0 - 968 We're cautious about this, we realize it and it has to do with the teachers attitude all along the line, too.

3 - 969 It's a discipline problem.

4 - 970 We all have to do something.

3 - 971 I don't care; I mean this is not only true of students, this is true of people you hire, professionals. Somebody has to be there to whip them into shape. They do this; they don't do this. Now it sounds like a dictatorial thing, but if you let it go, it filters down in and will carry over into the program.

V - 972 I agree with you.

4 - 973 I was very pleased with what I saw in here yesterday morning in the way of discipline.

2 - 974 We tend to have a continuing concern trying to avoid clashes between the engineers and the so-called production people. Is their any way - does anybody know how to solve that problem?

0 - 975 What I would call professional jealousy?

2 - 976 It's professional pride, professional competition. The question is who has more authority, the engineer or the production people? We've never resolved it.

4 - 977 If the production director has to have work done in every capacity, you eliminate this problem.

2 - 978 Yes, but we don't have a director, you see. Here's a course coordinator and he works with one engineer and here's another course coordinator and he works with somebody else. We don't have this over-all director.

4 - 979 Everyone in our organization has to go through these steps and he thinks twice before he makes a demand on someone that he wouldn't want to carry out if he were in that person's job.

1 - 980 Historically this has been a problem in broadcasting for years and years. I don't think that it has to be a problem, however, and I think that it is an administrative weakness usually. There must be an ultimate responsibility for a given program established and given to an individual. If it's the engineers, then the engineer is in charge. If it's the producer-director, then it's the producer-director in charge. There must be an ultimate responsibility, and then above and beyond that, this over-rating of engineering-production split, it must be done away with. It isn't necessary. I've operated both ways.

4 - 981 Ours is much more delicate than this. It's not a split in departments in that sense, but rather the relationship of one specific director to establish compared to another one, where the engineering staff might have a great deal more faith.

12 - 982 There are certain subtleties, I think, that you can insert in this business that makes these fellows feel whether it's the engineer or the production manager. Again we come back to this team business. I'm not the least bit reluctant to go to Scotty Cullen, our Chief Engineer, and say, "Scotty, what do you think of this idea?" And a straight production man, Jim Case, the Program Director, does it regularly. If I go to Jim very often and talk to him about some kind of a program he'll say, "I don't know, you better talk with Scotty." This goes into this whole business of making these people feel that they're a part of this thing.

4 - 983 Perhaps our staff is smaller.

6 - 984 The more the engineer knows about the production man's job and the more the production man knows about engineering, the better they work.

12 - 985 Within the last three months I started a policy within my own staff where I'm asking Scotty to either be there or assign (and I prefer this system) ask him to assign one of his engineers to be in the staff meeting - the production staff meeting. Sound off, feel free to sound off any time he wants to, the same as anyone else does. This breaks down that wall of engineer-production.

10 - 986 By far the bigger problem in my experience has been the morale of production and engineering people, but primarily production people. Again, maybe that's not the way to say it, maybe it is too, we have the faculty member who, for want of a better term is a prima donna. The person comes in, it is still a recognized thing, and his responsibility to instruct. If the job is done well, it is his credit. If it is done poorly, he must take the blame. So, whatever goes across, he must be responsible for. But this creates a very bad situation, as it has in the past, for the production people, to see things happening which they know in their heart of hearts should not happen and yet they have to go along with the game. They get ego involved in these things too, and the minute they get ego involved then they're dead, because they do not have any, even I think good indirect control much less direct control, and this has been a serious morale problem.

4 - 987 Notice how a staff will break their necks for a man that they really like and have a lot of respect for? And when the other man comes in they're doing their job, there's just a touch, just a subtle difference there. It's really hard to put your finger on an administrator, whom you call by first name and say, "Look, you're malingering on this." There's nothing you can prove.

1 - 988 I think one of the finest developments that now exists is the video tape recorder. Here, the production man can face the talent in the studio and the talent can say, "Oh, no. It goes my way." All the production man has to do after that show is over is take him back and play it back for him.

V - 989 Much approval.

0 - 990 Well Ed Kercheval is a teacher on our staff and has taught a couple years before the camera and has worked in and out of all areas. Ed, you might have come comments to contribute. You have both sides of the fence there.

14 - 991 I concur with what they've been saying here. I do think that this rift between production and engineering has been magnified until it's something it really isn't. But it is still serious enough that something must be done in a corrective manner to make sure it doesn't recur or doesn't continue - doesn't even begin, I guess is the best way.

0 - 992 This is really public relations within the institution.

12 - 993 This is a thing we've inherited from commercial television and there is a block between engineering and production regardless of what the reason is, it's there. So when you have a person coming then into educational television, from commercial television, he very often will bring some of these tags with him and it will very often take a while to get over them.

4 - 995 One of the greatest bonds is in writing. When the engineer wants thus and thus for his picture and the lighting director comes in and says, "Come on. Let's get out of this black two dimensions." You have more shadow with it and this is the one that creates the problem.

1 - 996 This can be easily remedied too.

3 - 997 I think this is management's problem of setting up the same things we are talking here, going back to the past; this is discipline within your own organization. You bring in a new man (I have done this, I have one that came from another station), which we were discussing yesterday. I didn't know why; we gave him a responsible position and I didn't know why I had to ride him as much as I did. I found out yesterday it was his background. I happened to go through the station and I saw the very same thing as normal working procedure which he had worked for a couple of years -- which I would not accept. And this comes back to this discipline. That is, having a place for things, putting them back when you're finished with them, and leaving it as you find it.. Now this, I think, is individual too. I may not fit into his operation; he may not fit into mine. But I think you must have someone there who will carry this line through. The same thing with the producer and director relationship. All these problems you are mentioning I don't have. All the problems that are mentioned at networks I don't have, and I have 11 people. And you might say, well he's an idiot. No, I'm not, I just don't have any trouble.

1 - 998 The more people you have the more trouble you have, like when you get up to 60.

3 - 999 Yes, 60 probably, 60 people, yes; I don't know.

14 - 1000 Getting back to what one of you said, talent sort of stands and/or falls on what happens. He either gets all the credit or gets booed out of the picture. It's like the backfield on a football team; you have to make a touchdown to win. Then again it's tough for him not to see how someone might block a bit differently and that's why so often the talent interferes with production. Perhaps he doesn't know. Perhaps he shouldn't say anything, but you know it's a little difficult not to try to get into it and do things a little bit differently when you think it might be of help to you.

3-1001 How do you feel about this "non-professional" doing the job for you? I ask you this question. Would you feel better if you had this kind of people here in this room behind you?

14-1002 I should think so, although I've never worked with a group like this. There are a number of things which you are forced into relying upon simply because you don't have time to do it, maybe the inclination to do it, nor the background that they have to do it.

V -1003 Respect?

14-1004 Partially, yes.

3-1005 When you have a man on camera that you know has been here only three days; do you say, "Gosh! Is he going to do this for me? Now, what's he going to do to me?" Is this what you go through?

12-1006 How many times do you see him and work with him before he actually takes his position?

0-1007 This all falls into an area of the team reference again. We have found that bringing in new people is a real tough problem. You fellows are here at a time when you will see a group of inexperienced, and I suppose we can say non-professional people working; at this time of year, near the end of the school term, they are at their best performance. In the fall, when schools reopen we start with many new people, form new crews, and it takes a while to establish the routine again, to get back to where we were at the end of the preceeding school term. You can learn to live with some of these problems.

1-1008 Do you have a very large carry-over, John?

0-1009 Not a great deal. There will be some, in the order of perhaps 30 to 50%. What we have done in the past is to start with a summer workshop a few weeks before school starts. Usually, after a promising student has worked for a year as a cameraman he may, if he shows a feel for the work, be promoted to a director's position. This isn't necessarily a rule as we couldn't promote all of the cameramen. A number of them leave after time as a cameraman and will never become a candidate for a director. It does make for a fluid arrangement. Again, I repeat, the group is right now in the best performance as a team so far as production is concerned. Does anyone else wish to make a contribution as far as finances are concerned? Money is one of the biggest problems - and probably controls the end product more than anything else is concerned - even after the equipment problem has been resolved.

2-1010 I recommend very strongly that we set up strict cost accounting methods on the operations; that we attempt to run an economical, justifiable operation. That is, in terms of closed circuit (that's the only thing I know about); we should have more productivity than we have expense. For example, in the ROTC program alone - by putting it on closed circuit versus the conventional staffing with some 35 to 40 in a class, 2-1010 we're saving something like 40 to 50 thousand dollars a year. But nobody seems to know where this savings goes after it's made.

V-1011 Approval of point.

2-1012 Because the operation hasn't been moved into the main tent. The Federal Government withdraws personnel because they see where they need only three principal instructors in the Air Force Program at our institution. We ask for a technical assistant; we can't get it. Essentially, we are subsidizing the Federal Government. Now, the same thing applies to other courses. When we save instructors in a given course, sociology or economics, where does the savings go? Where does it show? What proportion of it should go to the department itself? It just sort of gets lost in the limbo of finances.

V-1013 Point well taken and understood; typical of what is happening time and again!

2-1014 You can't get at this, you can't nail it down unless you do strict cost accounting on your operation. This is the comptroller's function. He should set up appropriate books in relation to your productivity as well as your expense items. How many student units, such courses as are taught, what does it cost to teach this normally, what does it cost to teach it in this (TV) manner? Get your differentials and put them on the President's desk! Get it before the Board of Trustees, etc.

7-1015 This does not apply, however, where television is used to supplement an existing program rather than primarily to reduce costs. In other words, there is certainly a different accounting needed.

2-1016 The same formula still applies. There is an expense and a return or result; you have to evaluate these two things. That is, what are you getting for your money?

V-1017 Questions but admitted acceptance of the correctness of the procedure.

12-1018 There is a question of how we could do it on all the general programs. We have a series in the afternoons, which I mentioned earlier, on homemaking. We have a pretty good idea as to how many people are enrolled (so to speak). This idea of translating the savings in terms of those who are enrolled in the television class as opposed to those enrolled in the normal class period makes a good comparison for these pruposes. I think it does just what you say, Ray.

0-1019 In closing this conference, I want to thank you for your cooperation, assistance and considerations. Should you wish to add to whatever has been said here after leaving, please write to me. You may take advantage of this opportunity to observe the Hagerstown operation, and we can exchange ideas, as time will permit.

Recommended standards for

Kinescope Recordings
Television Studio Equipment
Videotape Recordings

Supplied by

National Educational Television and Radio Center
2320 Washtenaw Avenue
Ann Arbor, Michigan

By permission. NETRC, Howard W. Town, Technical Director

NATIONAL EDUCATIONAL TELEVISION AND RADIO CENTER
REVISED KINESCOPE TECHNICAL REQUIREMENTS

The National Educational Television and Radio Center has established certain minimum technical requirements which constitute good engineering practice for kinescope programs which it will distribute. It requires that these standards be adhered to in order to obtain a universal film print which can be reproduced most efficiently over the various types of equipment in affiliated stations.

1. Technical Material and Identification To Be Supplied By The Producer

The producing organization will supply the Center with the following material. The Center requires that in all cases programs made for it be recorded double system.

Plan A: 16mm electronic composite sample print
16mm picture negative - "B" Wind
16mm magnetic sound track

Plan B: 16mm composite sample print
16mm picture negative "B" Wind
16mm optical sound negative - "B" Wind
16mm magnetic sound track

For each program under Plan A and Plan B, the producing organization should first supply the Center with one final trial composite (Sample Print) for approval before forwarding the original material. Upon acceptance, the material shown in Plan A and Plan B will then be handled in accordance with the contractual agreement worked out for the series or for the exchange program agreement.

The Sample Print (final, trial composite print) supplied to the Center will be the print struck from the following described negative material and must be of sufficient quality to be used as a release distribution print.

This print, like all prints supplied to the Center, must be vacuum treated or emulsion side waxed and mounted on a reel and in a suitable container. An accurate timing including program and NET credit should be listed on the can label. Refer to FIGURE 1, "Assemblage of Kinescope Picture Negative and Sample Print." Original materials furnished the Center must have:

Assemblage of Kinescope Sample Print

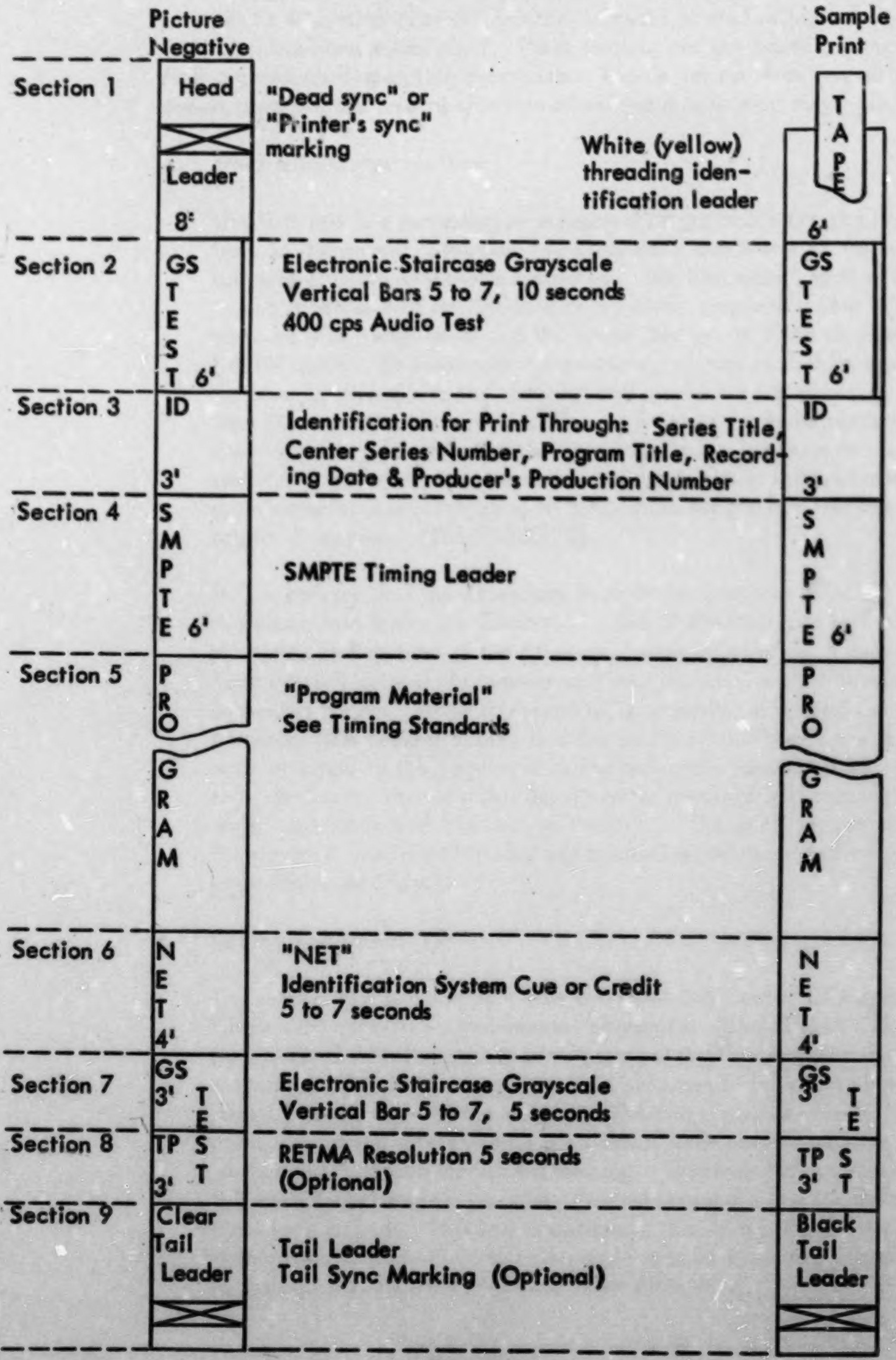

Picture Negative
Sample Print
Section 1
Head
"Dead sync" or "Printer's sync" marking
Leader
8'
TAPE
White (yellow) threading identification leader
6'
Section 2
GS TEST 6'
Electronic Staircase Grayscale
Vertical Bars 5 to 7, 10 seconds
400 cps Audio Test
GS TEST 6'
Section 3
ID
3'
Identification for Print Through: Series Title, Center Series Number, Program Title, Recording Date & Producer's Production Number
ID
3'
Section 4
SMPTE 6'
SMPTE Timing Leader
SMPTE 6'
Section 5
PROGRAM
"Program Material"
See Timing Standards
PROGRAM
Section 6
NET 4'
"NET"
Identification System Cue or Credit
5 to 7 seconds
NET 4'
Section 7
GS 3'
TEST
Electronic Staircase Grayscale
Vertical Bar 5 to 7, 5 seconds
GS 3'
Section 8
TP 3'
RETMA Resolution 5 seconds
(Optional)
TP 3'
Section 9
Clear Tail Leader
Tail Leader
Tail Sync Marking (Optional)
Black Tail Leader

FIGURE 1

2. Technical Tests To Be Made By Producers

In order to determine over-all quality, a means of evaluating television recording has been established. These evaluations are based on simple tests and standard operating procedure. The Center requires that all producers record these tests as standard operating practice on every program.

a. Electronic Grayscale Test

The first test is a recording of a segment of grayscale (vertical bars) from an Electronic "Staircase" or Grayscale Generator on the head and tail end of every kinescope recording. The Staircase Signal at the input to the recorder will be linear with the black step coincident with the standard 10% setup level and the white step set at 100% as measured on the IRE scale. The staircase generator signal may be fed through the studio switcher or directly to the recorder and should consist of not less than four nor more than seven steps; five or six steps is recommended. Staircase signal should be fed to the kinescope recording prior to program start for a minimum of 10 seconds, and again at the tail end of the program material just after going to black from the NET system cue or ID tag for 5 seconds. **(See FIGURE 1).**

It is necessary that the kinescope recorder be properly adjusted using the Electronic Staircase Generator. Use of the staircase test image on the Cathode Ray tube of the kinescope recorder provides a means of measurement using a photometer and enables setup and calibration of the recording system. After the recorder is properly set up and the studio cameras, film camera chain, and the studio output levels are in accordance or equal to the amplitude of the staircase signal at the kinescope recorder input, the resultant densitometer readings will represent the white and black end densities of the print. The densities produced in the program should be faithful representatives of the signal of the Reference Staircase Signal.

b. RETMA Resolution Test

The second test is made on a studio camera utilizing a RETMA Resolution Chart with corrected supplemental grayscales. The RETMA Chart should be televised with the best studio camera on a 90mm lens having optimum electrical adjustment and care should be taken to have the chart perfectly parallel to the front of the camera. The chart must be evenly lighted and carefully framed as viewed on the control room camera monitor so that its marked limits constitute normal framing. This test shall be made at the tail end of the program just after the last grayscale test for the period of at least five seconds. This test is optional. However, the Center may require that this be included in test prints or in special instances where further technical evaluation is required. **(See FIGURE 1).**

The RETMA Resolution Chart and supplemental Grayscale overlay strips are available from the EIA-Electronic Industries Association (formerly RETMA), Office Room 650, 11 West 42nd Street, New York 36, New York.

Charts available from EIA:

RETMA Resolution Chart-Revised 1956	$4.00
Grayscale overlay for Resolution Chart-set of 4	2.00
Linearity ("Ball") Chart	2.00
Linear Reflectance Chart	6.50
Logarithmic Reflectance Chart	6.50

The Supplemental Grayscales strips have been accurately calibrated and reflectance tested. These strips are to be pasted over the present or non-calibrated scales on the printed RETMA Resolution Chart.

c. Audio Level

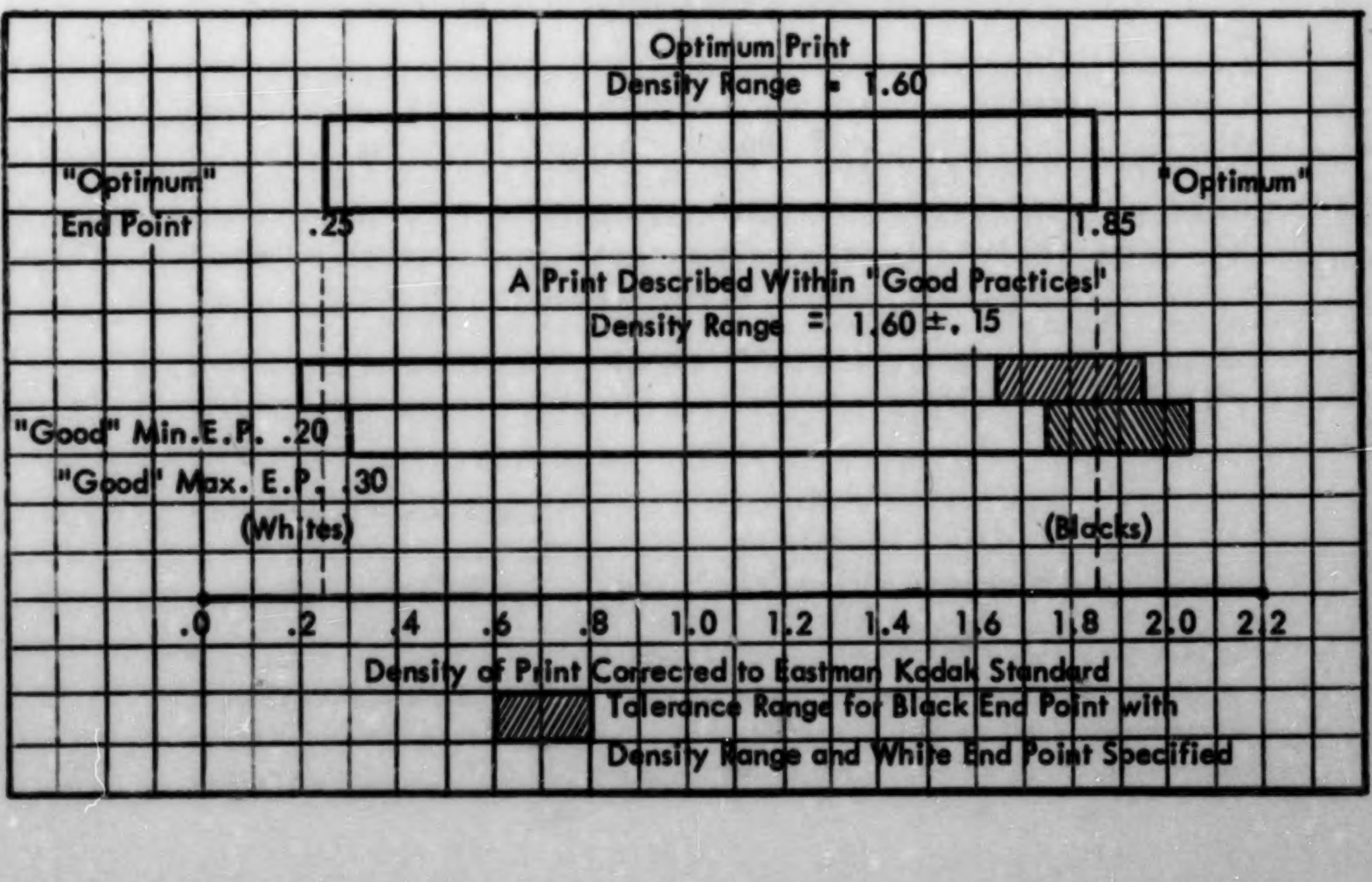
The third test for audio is the recording of a 400 cps tone to coincide with the Electronic Grayscale Generator Tests, and that of the RETMA Resolution Test Chart. The audio level shall be under the same conditions of equipment adjustment used for audio program material.

3. Print Density Requirements To Be Met By The Producer

The optimum print will have end density whites at .25 with a 1.6 density range to black.

A print described as being within "good practice" will have tolerances of whites at a density of .25 ± .05 with a 1/6 ± .15 density range to black.

Density Range for Positive Prints



The outside tolerances of acceptability are whites at a density between .15 and .40 with a density range to black between 1.40 and 1.80.

Recommended specifications on negatives: The recommended specifications for negatives are designed to result in a print made to the normal gamma of 2.5. The optimum will have negative whites at a density of .25 with a density range of 1.0. A negative considered in "good practice" will have negative whites at a density of .25 ± .05 with a density range of 1.0 ± .10.

These recommendations for negatives are based on the practice of exposing, processing, and printing same at normal laboratory gammas.

4. Print Density Range Measurement

The recording of the staircase signal should produce a grayscale with end point densities on the print ranging from a black density of 1.85 to white density of 0.25. In addition the over-all transfer characteristic of the kinescope recorder and the photographic process may be measured. The grayscale on the print can be evaluated by densitometer readings.

As a means of overcoming minor inconsistencies in densitometer instruments and operators, a procedure for densitometer calibration has been established.

An Eastman Kodak Photographic Calibrated Step Tablet will be supplied to each producer of kinescope recordings for the Center. With this strip the Center and all ETV producers may accurately calibrate their densitometers. Using the Kodak Calibration there should be general agreement in the readings. The Center has on hand the Kodak Calibrated Step Tablets, and they are available upon request.

After the grayscale end densities have been established, providing they meet specifications, the film can be projected into a properly adjusted television film camera system and observed on the associated control monitor oscilloscope. The grayscale segment should be set up so that the black step is at 10 per cent and the white step is at 100 per cent. Then without changing any controls the film will be allowed to run into program material. The latitude as displayed on the oscilloscope representing the program material will give an accurage comparison between the end densities of the electronic grayscale and the end densities of the actual program material. This procedure will provide a practical and comparatively accurate technique for measuring end densities within the print.

Vidicon Test Slide (CBC)

A new test slide for the adjustment of Vidicon Film Cameras will be procured and made available to those affiliated ETV stations producing film for the Center. The new 2 x 2 Calibrated Television Staircase Test Slide is somewhat similar to the RETMA Reflectance Chart and is a pair of ten step grayscales running in opposite directions horizontally and mounted on a uniform background having a diffuse density of .70 ± .03 density. Variation in density in the background of an individual slide in either horizontal or vertical directions are held to a minimum. The individual diffuse densities of the steps range from Step 1 white .25 to Step 10 black 1.85.

The tolerance is ± 0.02 density at Step 1, giving Step 1 a range from 0.23 density to 0.27 density.

The tolerance at Step 10 is ± 0.05 density giving Step 10 a range from 1.80 density to 1.90 density. The tolerance for the steps in between (2-9) are graded between the end tolerances.

When the slide is projected through a properly maintained and adjusted Vidicon Camera Chain and seen on the oscilloscope waveform monitor at the horizontal rate, the result will be a pair of linear crossed staircases with the background at approximately the center of the display.

5. Sound Recording Standards To Be Met By The Producers:

The Center requires that all producers record a 400 cps tone to coincide with the Electronic Grayscale Generator Test. The tone should be recorded under the same conditions or equipment adjustment used for program audio material. This test should not be confused with sync marks.

The Center has no preferences as to the system of optical sound track used and therefore sets no photographic standards. The following playblack characteristics are neither maximum nor minimum standards but a median to be used in judging a sound track:

Double System Print:

Frequency response: 100- 7,000 cps 3DB
Intermodulation distortion: 6% Variable Density
Crossmodulation products: 30DB Maximum for variable area.

Single System Print: (when used for special purposes and with prior arrangement)

Frequency response: 100 - 5,000 cps 3DB
Intermodulation distortion: 12% Variable Density
Signal-to-noise ratio: 30 DB

Consideration should be given to the reverberation content of the sound as both reverberation and ground noise are increased in effect by the sound limiting which often occurs in preparation for the optical track.

6. Program Timing Standards

The Center requires that program timing be not more than 5 seconds long or 10 seconds short.

The actual running time of programs produced for the Center shall be as follows:

Program	Minimum Total Running Time	Nominal Running Time	Maximum Total Running Time
Quarter Hour	14:20	14:30	14:35
Half Hour	28:50	29:00	29:05
Three-Quarter Hour	43:50	44:00	44:05
One Hour	58:50	59:00	59:05

The total running time of the program is measured from the first visible picture frame, following figure "3" on the SMPTE Timing Leader to the very end of the program including the last frame of the NET Credit.

7. Video Operation Procedure To Be Followed By The Producer

Studio cameras should be matched on the same scene, from the same angle and distance and with the same lens, for example, 50, 90, or 150mm lens. All studio cameras should be in optimum electronic adjustment in regard to transfer characteristics, geometric distortion, resolution, aspect ratio and provide excellent signals from an RETMA Resoltuion Test Chart.

Staircase film densities are valid only if the level of video signal from the studio cameras are adjusted to match the peak-to-peak amplitude of the reference electronic staircase signal at the kinescope recording input. It is imperative that studio levels be confined within the amplitude range of the electronic staircase generator. Glints, such as those produced from high reflected jewelry, should not be confused with the reference white step level. Such subject material producing short time duration video spikes, providing output, but above the white step, are extremely difficult to determine and they do not provide an adequate program white reference.

Once the video levels to the recorder are established, using the staircase signal as the level reference, studio output and camera output levels should be adjusted to conform. Extremely careful attention is required by the video operator to maintain proper setup of black level and peak white level adjustments to individual studio cameras. The video operator must continually and accurately check and maintain the proper adjustment prior to "on air" takes of studio cameras. Avoid "on air" adjustments. The frequency response of the CRO used in level measurements should be in accordance with the IRE Roll-Off Characteristic.

Final focus adjustments of the video recorder should be made using the RETMA Resolution Chart signal. If aperture equalization is employed, and it is strongly recommended for all kinescope recording operations, it should be adjusted for optimum effect while on the RETMA Resolution Chart. Care should be taken not to overcompensate as it will result in a noisy picture.

Good studio lighting properly coordinated with the video operation is essential to good kinescope recording. The scene should be illuminated in such a manner as to make a clear, intelligible setting and at the same time provide a good electronic picture signal free from noise and spurious effects. The brightness range of the scene should not exceed a 20 to 1 ratio and care should be taken to make full use of the TV gray tonal scale to provide good tonal rendition. It is necessary to have balanced lighting from scene to scene so that multiple cameras may provide a flow of matched pictures. With good tonal rendition particularly in the subject material with the use of good lighting techniques, the video lighting operation can be setup to bring depth in settings, produce visual separation in the foreground and background objects and add sparkle and luster to the picture by adding pleasing highlights. Producers, technical directors, video technicians and lighting technicians should be aware of lighting on all programs produced for the Center in order that the end product provides a pleasing picture quality by the artistic distribution of light and shadow.

In Kinescope Recordings, motion picture film inserts or film clips should not be recorded into the program from a film camera chain. Where film inserts are required "TV Soft" negatives should be obtained and edited into the Kinescope Negative.

Uses of the Electronic Grayscale Generator - F. M. Remley

It is generally acknowledged that the electronic grayscale ("staircase signal") is a valuable tool for assuring proper exposure of video (kinescope) recordings. Following are several uses for the grayscale signal in general studio operation as well as suggestions for its use in the recording process.

The electronic grayscale forms an excellent calibration pulse for standardizing oscilloscopes throughout a television studio installation. This can include all oscilloscopes used in camera control units, in master monitors and in the video recorder. Because the electronic grayscale signal contains only low frequency components, it is possible to loop one source through a large number of high impedance oscilloscope inputs, thus obtaining identical calibration signals for each oscilloscope without loss of accuracy in the signal amplitude.

So far as it is known, all makes of television equipment can be adapted to accept a grayscale for calibration purposes merely by substituting it for the built-in calibration signal provided in the equipment. Specific details for each brand of equipment can be worked out by the individual affiliates themselves. It is important to emphasize that although many items of television equipment are equipped with an internal calibration device, the desirability of having an idential signal appear at each oscilloscope should not be underestimated, since gradual deterioration of circuit components almost invariably leads to calibration discrepancies from one piece of equipment to another and operators are frequently not aware of resulting errors in level. As a result, by the time a signal does reach the video recorder, level variations may exist of a magnitude that is unacceptable. Camera-to-camera errors are perhaps the most common, but errors in maintaining standard studio output level can be equally serious if not compensated for.

The electronic grayscale signal was originally developed as a signal useful for determining the input-output characteristics of video amplifiers and transmission systems in terms of amplitude response. For this purpose an RF signal (in the range of 1 to 4 megacycles) is superimposed upon the staircase at the test signal source. After the signal has passed through the elements being investigated the staircase is removed by means of a high-pass filter, and the remaining RF envelope is examined for indications of compression as a function of signal amplitude. Application of this technique is very simple and should be carried out on a routine basis if at all possible. It will frequently be found that switchers, distribution amplifiers and stablizing amplifiers are contributing significant amplitude distortion at high frequencies. In fact, this is one of the few really satisfactory techniques for verifying the performance of the feedback video amplifiers used so commonly today, since the feedback will maintain low frequency output constant in spite of significant loss of tube transconductance.

Insofar as the kinescope recorder itself is concerned, the electronic grayscale is very useful as a device for accurately determining the grid drive to the kinescope tube, using an oscilloscope. It is also an accurate means of setting up for standard exposure by measuring the brightness of the steps as displayed on the face of the kinescope tube with a brightness meter, several types of which can be used. A brightness meter useful in reading grayscale steps on the tube face must have a narrow field of acceptance, and it must be possible to physically position the device so as to accept light from just one step at a time. The field of acceptance should not be so small, however, that the inevitable variations in focus over the roster on the face of the tube contribute to readings that cannot be easily repeated. It seems desirable for the meter to average the brightness of as many scanning lines as possible.

Keith Ketcham of WOI presented a paper at the Fall 1958 SMPTE Convention indicating a type of brightness meter that he found satisfactory. Other recording installations have made use of various commercial instruments. Any brightness measuring instrument so used, however, must be compared frequently to a standardized light source, or its calibration must be assured by photographic tests, in order to achieve good exposure control. Reference here should be made to the CBC's technique of using a calibrated light source to verify the reading of their brightness meter. (Journal SMPTE, Vol. 65, Jan. '56) It should also be mentioned that good exposure control can be achieved by use of a meter which will average the brightness of an entire roster. Such a meter can consist of a photocell located several inches in front of the kinescope, and is particularly useful when a meter cannot conveniently be placed in contact with the kinescope, because of X-ray or high-voltage considerations. In use, the photocell is used in establishing black-level tube brightness with no video applied, and then establishing average roster brightness with a full amplitude grayscale signal applied. This technique, described in more detail in the minutes of the 1956 NAEB Engineering Workshop, will disclose errors in black level, video drive, focus, high-voltage, or amplitude response, but will not identify the particular error involved, nor will it indicate the transfer characteristic of the television system up to the face of the kinescope. It is, however, simple, inexpensive and accurate.

The other main use to which the electronic grayscale should be put in a kinescope recording installation is that of evaluating processed kinescope recordings. By recording the electronic grayscale it is possible to determine very accurately the end point densities recorded on the film as well as to determine the over-all transfer characteristic of the entire kinescope recording process.

The Center will in the future arrive at a recommended technique for plotting the grayscale densities on a print in such a way as to allow them to be most easily interpreted in terms of over-all transfer characteristics. The specification of an over-all recording transfer characteristic will be considered only after a standardized transfer characteristic for an idealized film chain is established. It would seem likely that the kinescope recording transfer charachteristic arrived at will match, within a very small degree of tolerance, the transfer characteristic of the CBC standard test slide. (See NETRC Kinescope Technical Requirements).

One comment relative to the use of the electronic grayscale that deserves emphasis is that for greatest over-all accuracy, the electronic grayscale signal recorded on the kinescope film should have passed through, as nearly as possible, the entire studio video system. In other words, the most desirable place for inserting the grayscale signal to be recorded is at the studio switcher. In this way, all amplifiers and other pieces of equipment after the switcher are checked in terms of level and amplitude distortion, and we are well assured that the camera signals fed into the switcher are reproduced on the kinescope film in the same manner that the grayscale itself is reproduced. If this technique cannot be used, great care must be exercised to assure that studio levels correspond to the recorded grayscale signal.

In summary then it can be said that the electronic grayscale or staircase signal can be invaluable not only in setting up the studio system before a kinescope recording is made, but also in assuring that the resulting recording meets the specifications of the Center in terms of end point densities and, when established, transfer characteristics. No other test signal will assure these conditions, and considering the fact that a suitable electronic grayscale generating device is relatively inexpensive either in terms of construction cost, or of purchase price, the information accrued from its use will more than out-weigh the cost.

F. M. Remley, Jr.
Technical Director, University of Michigan
Broadcasting Service

NATIONAL EDUCATIONAL TELEVISION AND RADIO CENTER

TELEVISION STUDIO TECHNICAL REQUIREMENTS

REQUIREMENTS FOR CAMERA OPERATION

Studio cameras must meet the following minimum technical requirements:

1. 500 lines horizontal resolution.
2. Horizontal and vertical linearity within 2%.
3. Image retention (burn-in) will not be tolerated.
4. If using orbitors, corners must not advance into picture more than 5%.
5. Nine steps of the standard ETA logarithmic reflectance chart must be reproducible.
6. Image orthicons which are excessively noisy (usually new or very old tubes) should not be used because noise is seriously accentuated in video tape duplication.
7. Image orthicons exhibiting portholing, excessive dynode spots, poor shading characteristics, and black compression should not be used.

The condition of the film camera (vidicons, iconoscopes, and flying spot scanners) must meet manufacturers performance specifications. Vidicon film cameras, which are almost universally used, should be standarized with the CBC calibrated Staircase Test Slide obtainable through NETRC.

VIDEO AND AUDIO SIGNAL REQUIREMENTS

Video and audio quality evaluation prior to recording and on playback will be made using the monitoring equipment of the video tape recorder. Comparison of both "line" and "E-E" video displays should be made before recording and must meet the following technical requirements as well as those outlined in the NETRC Technical Manual.

1. The video content should extend from 10 to 100 IRE units for a normal scene.
2. Normally the average video level should fall at 50-60 IRE units. There is a tendency to hold the video signal to a maximum of 100 divisions regardless of picture content. However, in order to maintain good average level, the fine spikes from high detail areas, glint-lights, and specular reflections should be allowed to exceed 100 divisions.
3. Uniformity of gray-scale and video level must be maintained between cameras.
4. Target potential and lens iris adjustment must be set to avoid either black or white compression of the video signal and both adjustments should be made to avoid spurious effects caused by overexposure of tube.

5. Tilt and overshoot on the video signal shall not exceed the allowable specifications stated in EIA Standard No. RS-170.

6. Black or white streaking must be undetectable on a 10" picture monitor.

Audio quality must receive consideration equal to that of the video. Audio levels from all microphones must balance and have similar sound quality. If limiting or compression amplifiers are used, their audible affects on the signal should not be apparent or objectionable.

LIGHTING REQUIREMENTS

The over-all quality of the television picture is as dependent upon adherence to professional lighting practices as it is upon proper adjustment of the technical equipment.

The Television Studio Lighting Committee in the February, 1955, issue of the SMPTE Journal presented the following lighting definitions:

> Key Light - The apparent principal source of directional illumination falling upon a subject or area.
>
> Base Light - Uniform, diffuse illumination, approaching a shadowless condition, sufficient for a television picture of technical acceptability, and which may be supplemented by other lighting.
>
> Fill Light - Supplementary illumination to reduce shadows or contrast range.
>
> Back Light - Illumination from behind the subject in a direction substantially parallel to a vertical plane through the optical axis of the camera.
>
> Set Light - Separate illumination of background or set other than that provided for principal subjects or areas which may be composed of above items.

Application of these terms to practical lighting situations by eminent authorities has yielded the following general relationships:

1. That the incident key light not exceed twice the intensity of other front sources (base light, fill light) combined, except for special dramatic effect.

2. That the total front light, including key lights, falling on the immediate subject (talent, in particular) not exceed twice the intensity of the set light falling on the background.

3. That black light be sufficient to separate the talent from the background and be in the neighborhood of 1 1/2 times the front light intensity.

   It is desirable, whenever possible, to arrange all instruments on dimmers in order to more easily achieve proper balance and lighting ratios.

Ideally, the brightness range between highlight and shadow should be limited to a ratio of 20:1 if detail is to be seen at the extremes of the range. In addition to lighting, scene content enters into evaluation of the contrast range; hence brightness readings should be made, in addition to incident light measurements.

To maintain proper lighting balance and general control, the combined base and fill light should be in the neighborhood of 100 foot candles or less. It is generally true that the most pleasing results are obtained when the number of lighting instruments is kept at a minimum thus reducing hot spots, multiple shadows, and boom shadow - defects which must not be apparent in the picture.

The preceding lighting comments are presented as a guide for achieving the best television picture quality. Aesthetic considerations may introduce variations, but these must be made with due consideration to the requirements of the television system.

STAGING REQUIREMENTS

1. The total range in brightness used in scenery painting should not exceed a 20:1 ratio between extreme white and extreme black or between colors producing such effects.

   If this range were covered in 10 steps, each step would have a reflectance $\sqrt{2}$ times that of the next darker step. Practically, the extreme white step should have a reflectance of 60 - 80% and the extreme black step a reflectance of 3 - 4%, maintaining the 20:1 contrast ratio. On this basis, large areas of a set should be held between 40 - 80 IRE units exclusive, extreme white and black being used only for small accent features.

   Facial tones should fall between 50 - 80 IRE units.

2. Color may be used to obtain the various tone values in scenery and at the same time provide a more natural environment for performers. Generally, saturated colors are rendered by the television system into gray in accordance with the accompanying tabulation.

Saturated Hue	Monochrome Appearance	IRE Units
Violet	Black	10-30
Blue	Dark Gray	30-60
Green	Light Gray	60-90
Yellow	White	90-100
Orange	Light Gray	70-80
Red	Light Gray to Dark Gray	30-70

To achieve uniform reporduction, samples of all scenery colors, paints and materials should be observed over the television system and numbered in accordance with the nearest gray-scale step.

3. At least a small area of both reference white and reference black should be included in every scene to aid video level adjustments.

4. The reflectance of relatively large (as seen by the camera) adjacent areas should not differ in tone value by more than 2 to 1.

5. Extremely large monotone areas, particularly those which are dark, should be avoided. If unavoidable, very large areas should be broken up by a pattern and should be light in tone (e.g., IRE Units 60-80).

6. Continuous horizontal lines and structures of either dark or light tones should be avoided or broken up by a pattern or texture.

7. Direct canera pick-up of exposed lights and flames (candles, matches, etc.) should be avoided. If unavoidable, such lights or flames should be placed in front of medium-to-light-tone backgrounds.

8. White, highly reflective clothing, tablecloths, bedspreads, uniforms, and accessories should be avoided in favor of light blues, tans, grays, yellows and pinks.

9. Highly reflective jewelry, musical instruments, and other objects should be avoided. If they must be used, they should be wax-sprayed or otherwise treated to reduce reflectance. If reflective objects are placed in a diffuse light with a medium to light background, some relief from undesirable spurious effects may be obtained.

REQUIREMENTS FOR GRAPHIC MATERIAL

1. Photos and graphic materials presented on studio flip cards must be uniformly illuminated to avoid reflections which result in gray-scale distortion.

2. Material presented on flip cards should be uniform size.

3. Reflectance values of art materials should fall within a range of 3% to 80%, maintaining not over a 20:1 contrast ratio.

4. It is important for best technical reproduction that the average picture content of graphic materials fall within the middle range of the IRE scale.

5. If practical, art work and graphic material should contain reference white and reference black information.

6. Art work consisting exclusively of reference white and reference black should be reserved for superimposition purposes only.

7. Minimum lettering size should be standard 2 x 2, properly mounted under glass and conform to SMPTE standards (ready-mount slides are not acceptable).

8. Slides should be standard 2 x 2, properly mounted under glass and conform to SMPTE standards (ready-mount slides are not acceptable).

9. Unferrotyped glossy or semi-mat photographic enlarging paper should be used for all photographic reproductions.

REQUIREMENTS FOR PROPS

1. Because of the variety of outside properties which may be used, the producing centers must be mindful of the need for observing reflectance values, gray-scale separation, physical appearance and presentation, etc.

2. Highlight reflections from highly polished materials should be subdued by using dulling spray.

NATIONAL EDUCATIONAL TELEVISION AND RADIO CENTER

VIDEOTAPE TECHNICAL REQUIREMENTS

The National Educational Television and Radio Center has established certain minimum technical requirements which constitute good engineering practices and are in accordance with proposed SMPTE Recommended Practices for programs which it will distribute on videotape.

It requires that the following be adhered to in order to obtain complete interchangeability for videotape network operations, provide consistently uniform audio and video recording quality, and provide technically acceptable programming for broadcasting over all NET affiliated stations.

1. Technical Tests To Be Made By Producers

In order to determine over-all quality, a means of evaluating videotape television recordings has been established. The tests are simple and based on standard operating procedure.

a. Video Alignment Signal

At the head end of the tape, a minimum of 60 seconds of staircase and 30 seconds of window shall be recorded at the level and under the same conditions of equipment adjustment used for video program material. See FIGURE 1.

Simultaneously, an audio tone of 400 cps shall be recorded at the level and under the same conditions of equipment adjustment used for audio program material.

b. Identification Information

Visual identification information shall be recorded following the alignment signal for 10 seconds, spaced at least 10 seconds ahead of the start of program material. See FIGURE 1. The identification shall contain, as a minimum:

(1) Program title - series title
(2) Identification number
    NETRC Series Number
    Producer's Production Number
(3) Date of recording
(4) Nominal length (minutes and seconds) of program recording
(5) Recording studio name or call letters.

This above identification shall also be marked on the first few feet of videotape, using a Flo-Master Felt-Tip Pen No. CP-05, Standard

(Black) - or equivalent. The identification shall be marked on the glossy side, and should include the exact program length in minutes and seconds as indicated on the tape timer of the recorder.

c. Cue Signals

Audio cue signals, as described below, shall be recorded on this audio program track following the visual identification.

(1) The audio cue signal shall consist of a 400 cps beep of 1/5 second duration, occurring as a minimum at 9, 8, 7, 6, 5, 4, 3, and 2 seconds ahead of the program. The recording level shall be under the same conditions of equipment adjustment used for audio program material.

(2) In addition, a steady component of the audio cue tone beep shall be recorded approximately 20 db below the level used in (1), above, starting with the first beep and ending with the last one to leave a 2 second completely silent interval before the start of program material. See FIGURE 1.

Video cue signals: A visual cue signal (such as a digital display or Academy Leader Device can be recorded during the entire period of the steady audio component of the described audio beep tone. Sync (or sync and setup) shall only be recorded during the 2 second interval from the end of the beep tones to the start of program. The recording level shall be under the same conditions of equipment adjustment used for video program material.

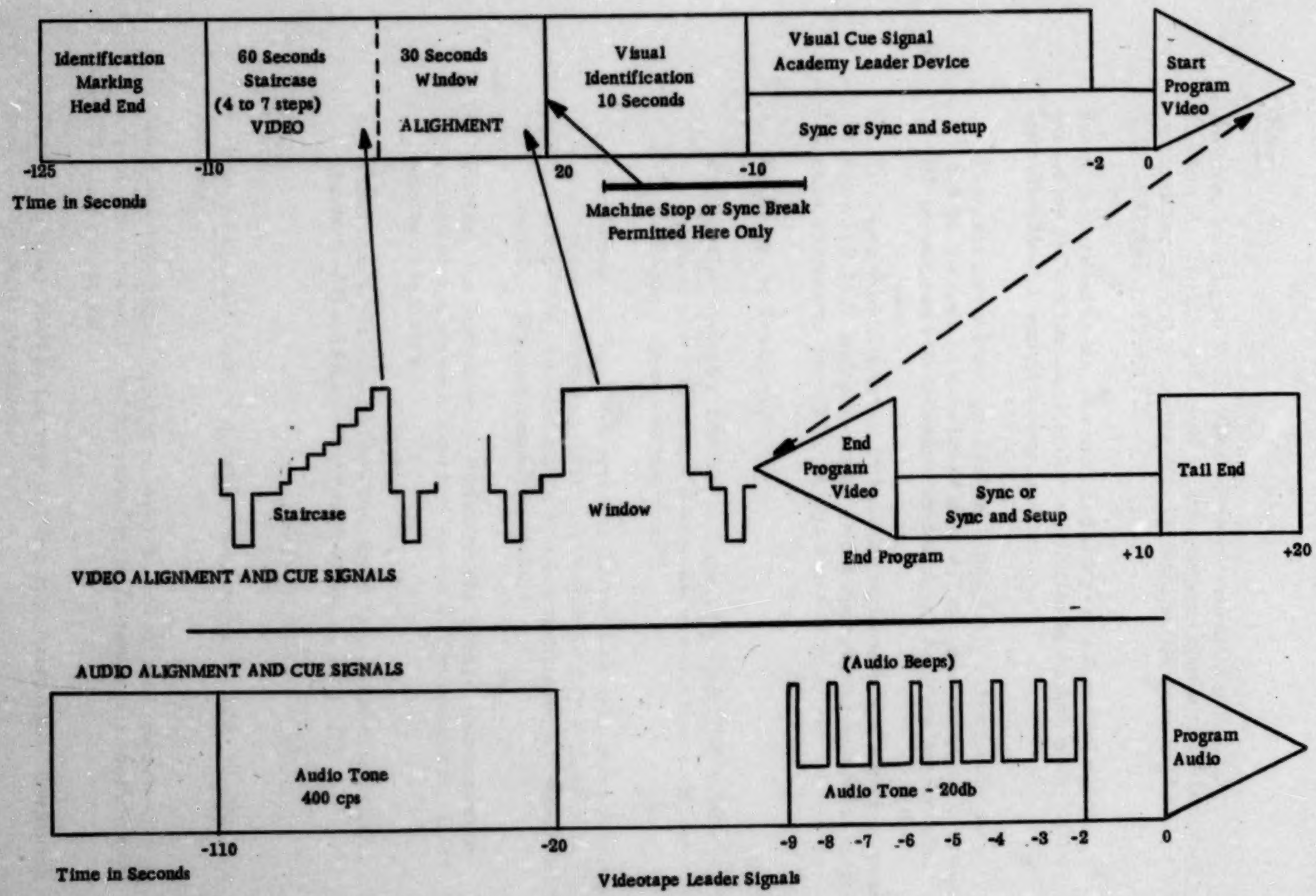
If a visual cue signal is used, it is recommended that it be a numerical readout coincident with and identifying the audio beep tone signals as described with (1) audio cue signals.

The sync (or sync and setup) signal applied to the videotape leader should be the same signal and from the same source as that used with the succeeding program.

(1) A minimum of 10 seconds of sync (or sync and setup) shall conclude each separate videotape recording. There should be sufficient black to preclude any noise from getting on the air because of slow switching.

(2) A minimum of 10 seconds of tape to insure tape wrap around the storage reel after the conclusion of playback shall be provided after the 10 seconds of sync (or sync and setup) concluding a recording. See FIGURE 1.

FIGURE 1


Identification Marking Head End
60 Seconds Staircase (4 to 7 steps) VIDEO
30 Seconds Window ALIGHMENT
Visual Identification 10 Seconds
Visual Cue Signal Academy Leader Device
Sync or Sync and Setup
Start Program Video
-125
-110
20
-10
-2
0
Time in Seconds
Machine Stop or Sync Break Permitted Here Only
Staircase
Window
End Program Video
Sync or Sync and Setup
Tail End
End Program
+10
+20
VIDEO ALIGNMENT AND CUE SIGNALS
AUDIO ALIGNMENT AND CUE SIGNALS
Audio Tone 400 cps
(Audio Beeps)
Audio Tone - 20db
Program Audio
-110
-20
-9
-8
-7
-6
-5
-4
-3
-2
0
Time in Seconds

Videotape Leader Signals

2. Over-All Quality Requirement To Be Met By Producer

Video

The video input signal to the VTR shall be in accordance with E.I.A. Standard No. TR-135 and Federal Communications Commission TV Technical Standards Sec. 3.682, Subsection (A), Transmission Standards and Sec. 3.699, FIGURES 5, 6, and 7.

Except as specified herein, the audio and video recordings shall meet or exceed the performance specification as indicated in the Ampex VR-1000-B Instruction Manuals and subsequent revisions.

a. Video Frequency Response: Uniform within + or - 2 db from 20 cps to 3.6 mc and down no more than 4 db at 4.2 mc. The horizontal or vertical tilt as measured with a standard window signal should be less than 2%.

b. The Signal-to-Noise Ratio: Performance better than 36 db, peak-to-peak video to R.M.S. wideband noise. (Noise measurement includes unweighted noise components from 100 kc to more than 4.2 mc.)

c. Related Video Requirements

   (1) Transient response: Less than 0.2 usec. rise time (10% to 90% measured with a 15 kc square wave having a rise time of no less than 0.02 usec.) Overshoot less than 7%.

   (2) Differential Gain: No more than 10% at peak white or black levels, at normal video signal levels, and with input duty cycle of either 10% or 90%, no more than 10% in intermediate range. Measurement by I.R.E. Standard Step Signal Method.

d. Vertical Line Displacement: Horizontal displacement (quadrature) of vertical picture elements should not exceed 0.05 microseconds. (1/64 inch on 21 inch screen)

e. Video Channel-Horizontal Stability: Equal to or better than F.C.C. Standards of Good Engineering Practice, III, A, 3.687a(8).

Audio

Frequency Response: Equal to or better than + or - 2 db, 50 to 10,000 cycles per second.

Signal-to-Noise Ratio: Equal to or better than 50 db measured over-all with reference to a recorded level corresponding to 3% total r.m.s. distortion at 400 cycles per second.

Flutter and Wow: Shall be less than 0.15% r.m.s. measuring all components from 0 to 200 cycles per second.

Distortion: Equal to or less than 1% r.m.s. at 400 cycles measured at normal operating level, (normal operation level is 6 db below 3% r.m.s. distortion level, or peak recording level).

3. Operating Requirements To Be Met By Producer

a. Heads

(1) The four heads on the VTR shall be matched for a minimum of banding effects. This should be accomplished in accordance with the Ampex VR-1000-B Instruction Book TTR-14, (i.e., differences among heads in noise level, resolution, horizontal displacement, transient response.) The recording-current level to each head should be selected for optimum noise level and uniformly low transient response among all four heads. It is essential that optimum recording current level be selected. The resulting effects due to improper head current optimumization cannot be rectified in the reproduction or duplication process. Programs with obvious banding effects will be considered unsuitable for duplication.

(2) The quadrature alignment of the head used for recording should be such that it is able to playback the Ampex Standard Alignment Tape with minimum horizontal displacement of vertical lines in adjacent bands. This requirement should be met for all of the four possible tracking positions. Deviations in excess of 0.05 microseconds shall be considered unacceptable.

b. The Center requires that all videotape recording equipment be properly aligned prior to recording programs for NET duplication and distribution, using a standard alignment test tape. Ampex Catalog #50262-05 Video Head Reference Tape.

It is essential that the standard alignment tape be used for reference adjustments to maintain interchangeability among tapes exchanged between the affiliated NET stations and the NETRC.

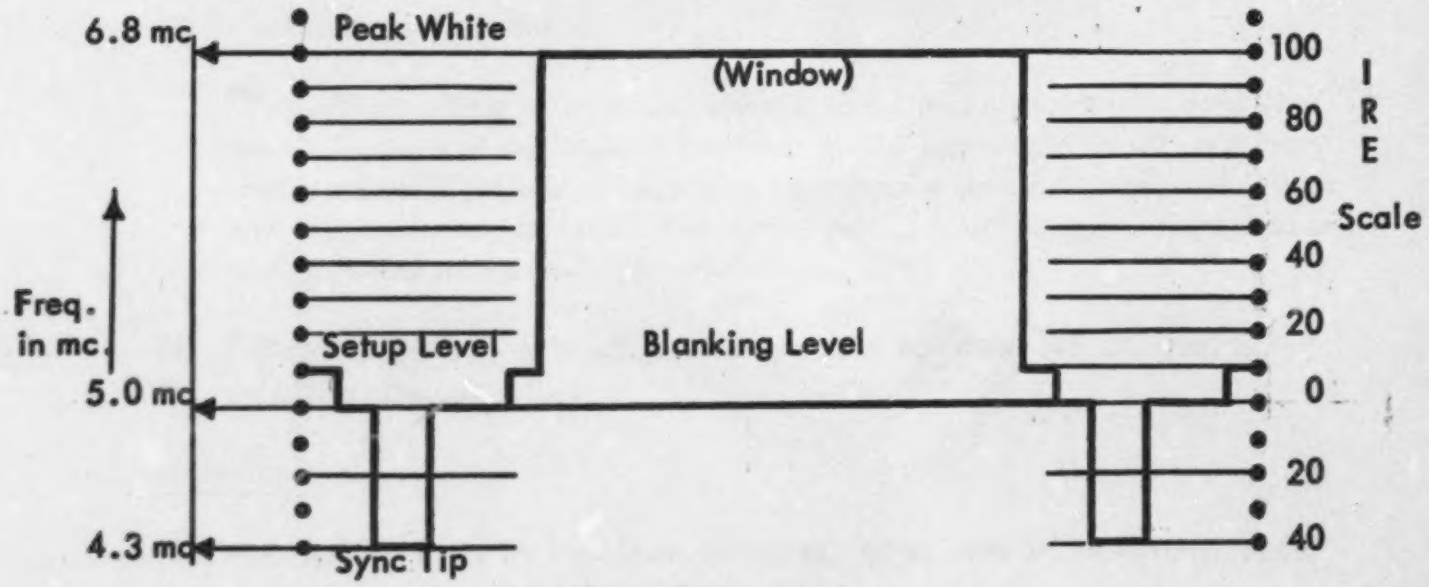
c. Vacuum Guide Adjustments

(1) Horizontal Alignment: Vacuum guide pressure setting should be adjusted for minimum skewing (angling of vertical lines within bands) when playing back the Ampex Standard Alignment Tape. The correct vacuum guide pressure setting is achieved by adjusting for minimum skewing or venetial blind effect or uniform vertical lines. Deviations in excess of 0.05 microseconds shall be considered unacceptable.

(2) Vertical Alignment: Vacuum guide height should be determined for minimum scalloping (curvature of vertical lines within each band) when playing back the Ampex Standard Alignment Tape. Deviations in excess of 0.05 microseconds shall be considered inacceptable.

d. Video Signal Adjustments:

Frequency modulation (monochrome): Blanking level shall correspond to a modulated FM carrier frequency of 5 megacycles. Carrier deviation will be adjusted to the proposed SMPTE Recommended Practices of 2.5 mc with sync tips at 4.30 and peak whites at 6.8 mc.


6.8 mc
Peak White
(Window)
Freq. in mc
Setup Level
Blanking Level
5.0 mc
4.3 mc
Sync Tip
100
80
60
40
20
0
20
40
I R E Scale

Frequency Deviation

Videotape FM Modulation Swing

(Monochrome)

The head servo adjustments should be checked frequently prior to recordings to assure freedom from any horizontal instabilities of the playback picture. Recording should be made with the head servo control chassis locked to the incoming video signal.

The tape transport and head assembly should be properly cleaned prior to recording, in accordance with the Ampex Instruction Book CKO-41. It is necessary that the video head assembly be checked or demagnetized to insure optimum picture quality.

(1) 3-M is to factory burnish videotape. 75% of the tape now released is factory burnished, and they expect within the next few weeks to have 100% output processed in this manner.

(2) Factory burnished tape is indicated by the addition of "B" after the serial number on the reel.

(3) Videotape Dropouts:

"The effects of circuit malfunction are sometimes mistaken for defective tape. In the last analysis, it becomes rather impossible to set up quantitative classifications of recording tape from a dropout standpoint unless one also includes, at least, the parameters of limiting gain, system noise, and transient response." Mr. Holmberg.

(4) Fifteen (15) video dropouts per minute does not meet NETRC quality requirements.

e. Videotape

The tape surface shall be free from scratches, abrasions, indentations, and pre-recording splices and other imperfections.

The frequency of video dropouts should be no greater than normally encountered in the current quality of videotape material.

New Tape Evaluation and Preparation

(1) Determine condition of recorder to be used for evaluation by checking with an accepted operational tape.

(2) New videotape should be properly burnished with at least two passes in the record or playback mode of operation to minimize video dropout activity.

(3) Spot check at least five sections throughout entire reel. Record and playback one minute section of tape to be evaluated for video dropout activity.

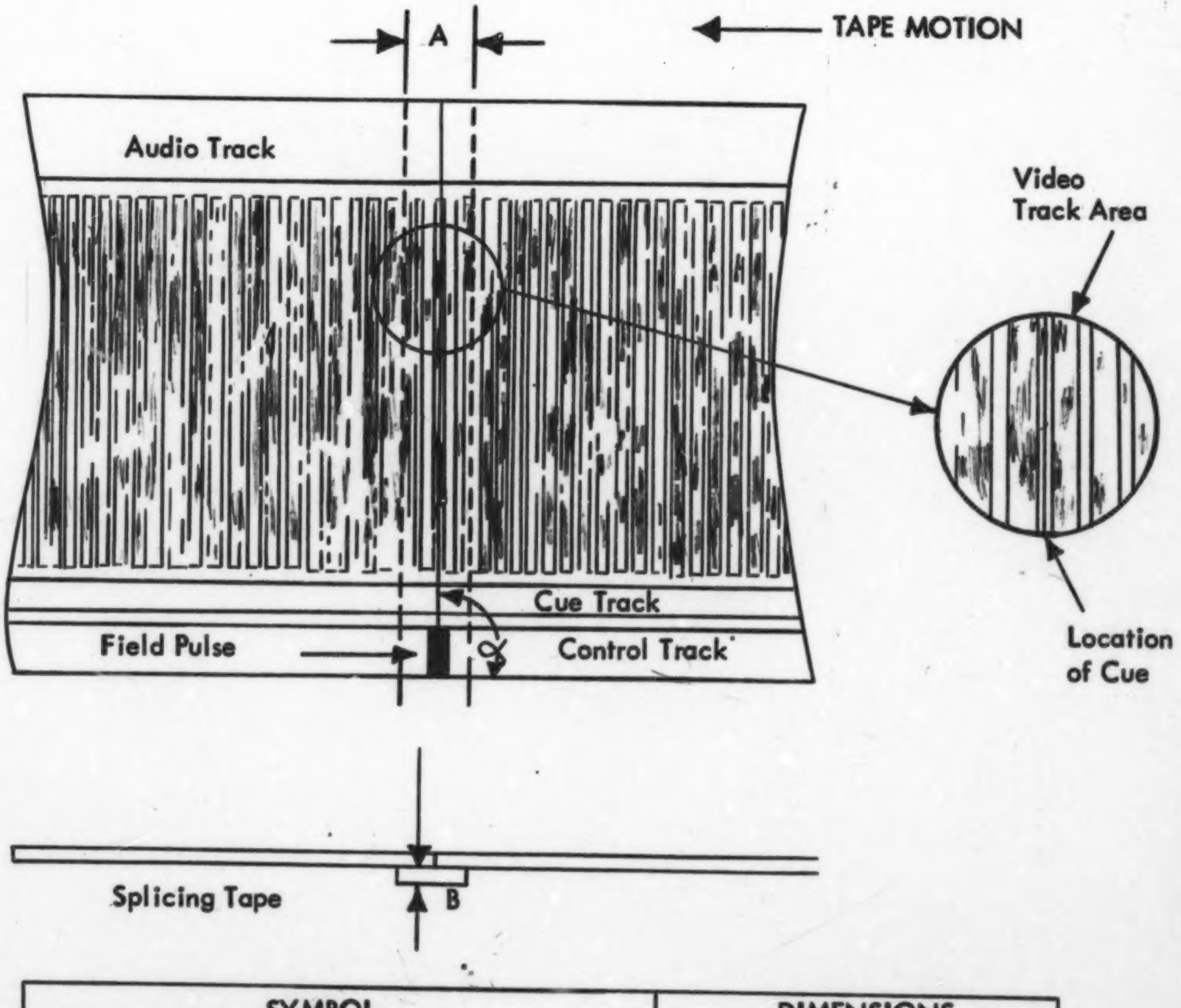
(4) Factory splice check: All splices should be checked by recording and playing back over spliced area. Observe if splice playback is free from scratches, abrasions, indentations, wrinkles, and dropouts. Splices should be checked for control track or audio playback level changes at splice transition.

f. Recommended Practice for Splicing Videotape

Location of Splice

The proposed SMPTE recommended practice is shown in F .

RECOMMENDED PRACTICE FOR PATCH SPLICES IN MAGNETIC VIDEO RECORDING TAPE


A
TAPE MOTION
Audio Track
Video Track Area
Cue Track
Field Pulse
α
Control Track
Location of Cue
Splicing Tape
B

SYMBOL	DIMENSIONS
A - Width of Splicing Tape	0.25 inches, Nominal
B - Thickness of Splicing Tape	0.0007 Maximum Inches
α	90 degrees 33 min. ± 3 min.

FIGURE 2

The splicing tape is 0.25 inches wide and a maximum of 0.0007 inches thick.

The proper location of the cut is shown in the center of the field or edit pulse, which is recorded in the control track. The exact location of the cut is determined as the center of the guard band, between the two adjacent video tracks.

Care should be taken in order that the separation between the two cut edges after splicing shall not exceed 0.001 inch at any point along the cut.

The longitudinal distance between corresponding points on the recorded transverse video tracks immediately preceding and following the splice shall not depart from the average distance between successive tracks by more than ≠ or - 0.0005 inch of a recorded tape.

The splicing tape on a finished splice shall not extend beyond the edges of the magnetic videotape.

The guided edge of the magnetic tape on either side of a splice shall lie on a common straight line when the tape surface is constrained to lie in a plane.

Taped material shall contain no post-recording splices except those made with the correct blanking intervals of the joined sections and in which the splice follows the vertical sync pulse in time. The splices shall be made in a workmanlike manner, equaling or exceeding the strength of the original material and capable of withstanding the stresses encountered in normal starting, stopping, playing, and high speed winding operation on the recorder. See FIGURE 2.

g. Program Timing Standards

The Center requires that program timing be not more than 5 seconds long or more than 10 seconds short.

The actual running time of programs produced for the Center shall be as follows:

Program	Minimum Total Running Time	Nominal Running Time	Maximum Total Running Time
Quarter Hour	14:20	14:30	14:35
Half Hour	28:50	29:00	29:05
Three-Quarter Hour	43:50	44:00	44:05
One Hour	58:50	59:00	59:05

The total running time of the program is measured from zero (FIGURE 1) just after sync or sync and setup to the last indication of the NET credit or last picture prior to sync or sync and setup.

EVALUATION OF VIDEO HEAD ASSEMBLIES

a. Preliminary Visual

The Video Head Assembly is carefully removed from the carrying box and placed on a clean work surface. The inspector examines the unit visually to determine the extent, location, and, if possible, the responsibility of any mechanical or electrical damage that has occured to the returned head assembly. The areas and parts covered by this routine inspection include the following items:

(1) Control track shield in place.

(2). Drum is free to rotate with the solenoid arm engaged.

(3). There is proper spring tension applied to the female guide arm.

(4). The glyptoled screw adjustments have not been moved or tampered with.

(5). The brush housing is properly located and has not been damaged.

(6). All of the brushes are held in place by the appropriate brush springs.

(7). The brushes are contacting their respective slip rings and are properly seated. (This is seen from the bottom of the brush housing by means of a mirror.)

(8) All the electrical terminals are properly soldered and the leads are securely in place. This includes the brush housing terminals, drum terminals and both blue ribbon connectors.

(9). That there is no damage to the motor shield, dust shield, motor mounting bracket, etc. (This shows improper handling.)

(10). The vacuum gaskets are in place and properly sealed.

Any discrepancies or oddities that the inspector notices are recorded on Quality Control Form 3005 and retained with the Head Assembly. Also it is important to note that any part that is not to the latest modifications is recorded on the rework tag so that during the rebuilding cycle it will be removed and replaced with the latest version.

b. Operational Evaluation

After the preliminary visual has been completed, and it has been ascertained that the head assembly does not have any mechanical or electrical defects that will either damage the unit being tested or the test equipment, the unit is placed on the operational test equipment and the following tests performed:

(1) The tip projection is measured and recorded. This is accomplished by attaching a .0001"dial indicator to the stud on the motor housing mount

and actually measuring the protrusion of the tips above the outer periphery of the drum.

(2) The operation of the P.E. cell and exciter lamp is measured. The combination must produce an output voltage greater than 6 volts, peak to peak at 240 cps.

(3) The condition of the bearings are ascertained. During this preliminary test the sound and vibration of the bearings give an indication of their dynamic condition.

(4) The pre-load and female guide height is set to the Ampex Head Alignment Tape #50262-05. During this process several other items are ascertained among which are:

(a) The ability of the head assembly to maintain the proper vacuum in the three operating conditions: fast forward, play, and fast rewind.

(b) The repeatability of the female guide.

(c) The action of the solenoid and solenoid arm.

(5) Standard recording tape is threaded across the transport and a standard monoscope recording is made. During the reading process the optimum record currents are noted and set for the video heads; the control track record level is noted. This recording is played back (reproduced) and the quality of the picture evaluated in regard to:

(a) Signal to noise ratio.

(b) Waterfall (i.e., condition of the motor bearings, balancing of the drum, etc.).

(c) S distortion or what is more commonly called sunflower. This idiosyncrasy is also associated with defective motor bearings, slip ring run-out, dynamic balancing of the drum etc.

(d) Picture quality.

(e) Quadrature: In order that this assembly be interchangeable with all other video head assemblies, an electronic unit switches the output of the video channels in such a manner that Channel #1 is playing back the signal recorded by Channel #4 and Channel #4 is playing back the signal recorded by Channel #3, etc. The channel reproducing the other channels' signal must be in line with that channel or in other words, for interchangeability, each channel must be separated from the preceding channel by a factor of 90°. If a segment is greater than 90° or less than 90° the reproduced segment of this misaligned sector will lead or lag the other segments respectively. In order to compensate for this discrepancy, the defective segment is moved by means of the quadrature adjustment screws to bring the segment into 90° alignment.

(f) Dime output - i.e., the ability of the dime assembly to reproduce the video signal at a level that is sufficiently near the record level to prevent distortion due to noise, etc.

(g) Electrical noise: due to defective motor wiring, slip rings, brushes, etc.

All discrepancies noted by the inspector are recorded and a copy of these defects is retained with the video head assembly to aid Manufacturing in their rework.

SUGGESTED FORM FOR RECORDING VIDEO HEAD ASSEMBLY HISTORY

Head Current #1									
#2									
#3									
#4									
Head Hgts. #1									
#2									
#3									
#4									

Guide Alignment ______

Control Track:
Width ______
Position ______
Levels ______
Track Development:

Comments: ______

	OK	Defective	Other
Quadrature			
Signal/Noise Ratio			
Head Hunting			
Waterfall			
"S" Distortion			
Head 1 2 3 4			
Exciter Lamp			
Photo Cell			
Slip Rings			
Brushes			
Solder Connections			
Mech. Inspection			

Note:

Track Development: A section of videotape containing a recording is developed by submerging the tape into Edivue Tape Developing Fluid. A section of regular Scotch cellophane tape is applied across the tape. The cellophane tape is carefully removed from the videotape, and the magnetic particles from the Edivue solution are retained on the Scotch cellophane tape. This tape is applied under Track Development on the above form for track spacing evaluation.

SUGGESTED FORM FOR RECORDING

VIDEO HEAD ASSEMBLY HISTORY

Reverse Side

Head #						
VTR#	Date In	Hour In	Date Out	Hour Out	Total Hours	Remarks

Signal to Noise Ratio Measurement

The following is a described technique for making a S/N ratio measurement on the videotape recorder.

It is presumed that the videotape recorder has been adjusted for optimum performance.

1. Adjust video detector balance for maximum rejection of carrier fundamental, with carrier frequency set at 5 mc and deviation set to zero.
2. With a standard monoscope or window signal applied to the input of the modulator, set carrier frequency and deviation in accordance with the proposed SMPTE standard, i.e., 5 mc carrier frequency corresponds to black level and 6.8 mc corresponds to peak white.
3. Record a two-minute section of monoscope or window signal and rewind the tape to the beginning of the recorded section.
4. Place the machine in the reproduce mode and adjust the video output level control on the demod for an output level of .7 volt peak-to-peak video, not including sync.
5. Remove the video cable from input to the modulator in order to disable clamping. Set the carrier frequency to 6 mc corresponding to a medium shade of gray.
6. Record a two-minute section of carrier and rewind tape to the beginning of this recording.
7. Remove the video cable from the demodulator output and connect the special bandpass filter, described in FIGURE 3, to output of the demodulator. Terminate filter in 75 ohms. Connect the output of this filter to an r.m.s. measuring vacuum tube voltmeter with a band width of at least 100 cycles to 4 mc. The Hewlett-Packard Model 400-D is very suitable.
8. Place the machine in the reproduce mode, set the scope selector switch on the left-hand control panel to "switcher output" and adjust tracking for maximum amplitude of the scope presentation.
9. Read the value to r.m.s. noise on the vacuum tube voltmeter and compare this figure to the .7v p-p level. Twenty times the log of this ratio is defined as the S/N ratio of the videotape recorder.

Pitfalls to Avoid

1. If the tape being used has scratches or other types of dropouts, great difficulty will be experienced in attempting to make a S/N measurement because the ballistics of the r.m.s. meter are such that the indicator may not remain in its assigned position for a long enough period between dropouts.

2. Adjustment of the detector balance control must not be changed after the video output level of the demodulator has been adjusted because the detector balance has an affect on the output level of the detector.

3. Care should be taken to assure that optimum tracking adjustment has been checked.

4. It is necessary to minimize the contribution of switching transients to the noise measurement by carefully optimizing switcher adjustments in order to reduce the magnitude and duration of switching transients to a minimum.

A Technique for Setting Carrier Frequency And Deviation of the Videotape Recorder

A crystal controlled oscillator with an accurancy of .01% can be useful in accurately setting carrier frequency and deviation of the videotape recorder in accordance with the proposed SMPTE Recommended Practices.

The calibrator can be set to operate at 5 mc with an output of approximately 0.6 volts or at 6.8 mc with an output of approximately 0.4 volts.

A convenient procedure, using the crystal calibrator in conjunction with a Tektronix Model 543 oscilloscope or comparable instrument, is as follows:

1. Connect to the modulator input, a window signal, a stair-step signal, or any other convenient signal containing a large proportion of energy in the peak white region. The peak-to-peak value of video, not including sync, should be the standard level used in normal system operation.

2. Set the frequency switch on the calibrator to 5 mc.

3. Couple the output of the calibrator to the input of the oscilloscope. Adjust the oscilloscope to display exactly 10 cycles of the crystal calibrator in 10 centimeters of the oscilloscope reticle.

4. Connect the oscilloscope input to the RF OUTPUT test point on the modulator.

5. Adjust the modulator input level to zero and adjust the modulator FREQUENCY control to allow ten cycles of the modulator r.f. signal to occupy exactly 10 centimeters of the oscilloscope reticle. Carrier frequency corresponding to black level has now been adjusted.

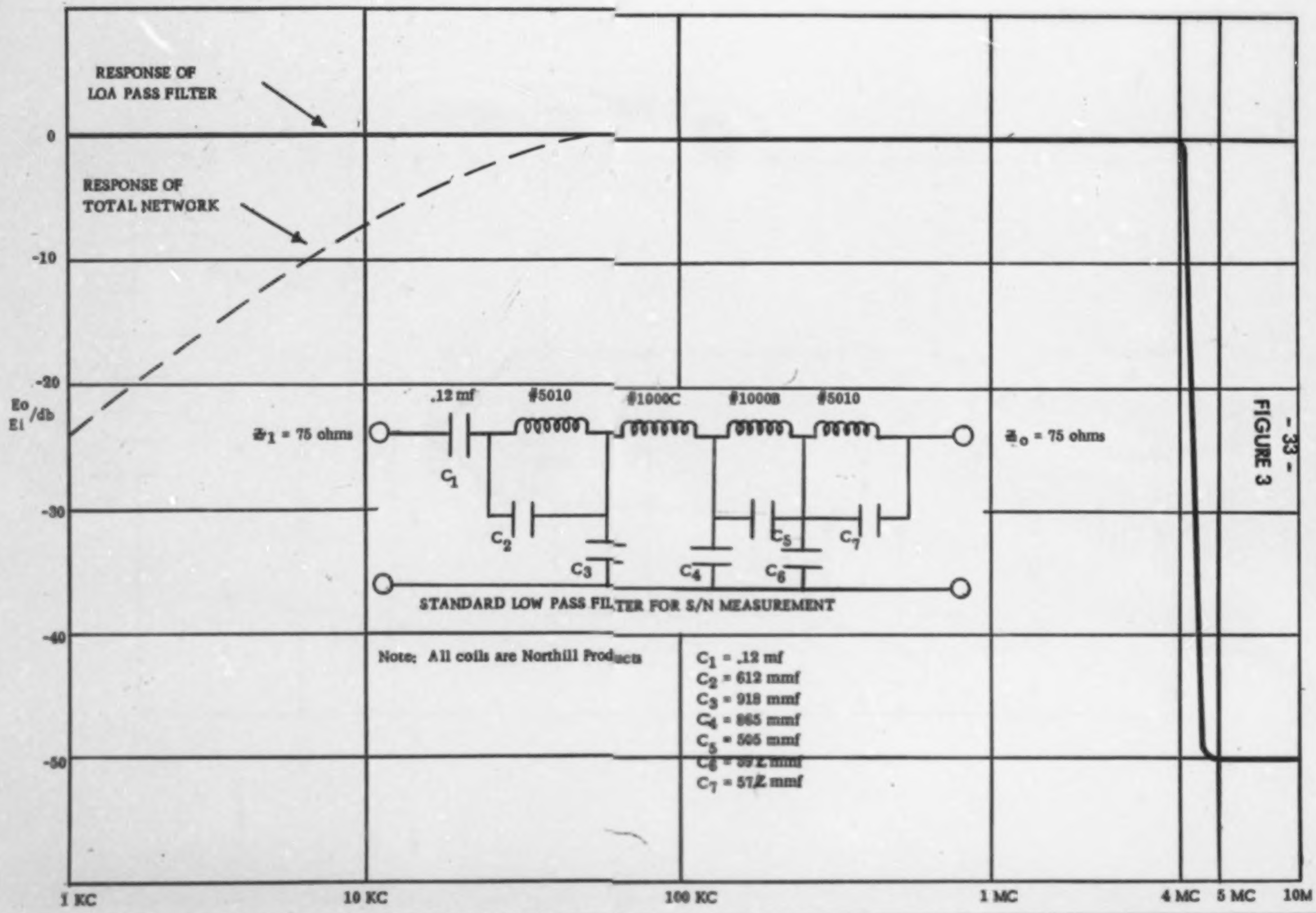
6. Set the frequency of the crystal calibrator to 6.8 mc and repeat Steps 3 & 4.

7. Adjust the modulator INPUT LEVEL control until 10 cycles of the highest frequency (corresponding to peak white) occupy exactly 10 centimeters of the oscilloscope reticle. Deviation corresponding to 6.8 mc for peak white has now been adjusted.

8. As an alternate method to the above, a dual-trace preamplifier may be used with the oscilloscope. The calibrator output may be fed to one of the channels and the RF OUTPUT of the modulator may be fed to the other channel. The FREQUENCY and INPUT LEVEL controls may then be adjusted until coincidence between the two patterns at 5.0 mc and 6.8 mc has been established.

See FIGURE 4, Crystal Calibrator.

FIGURE 3



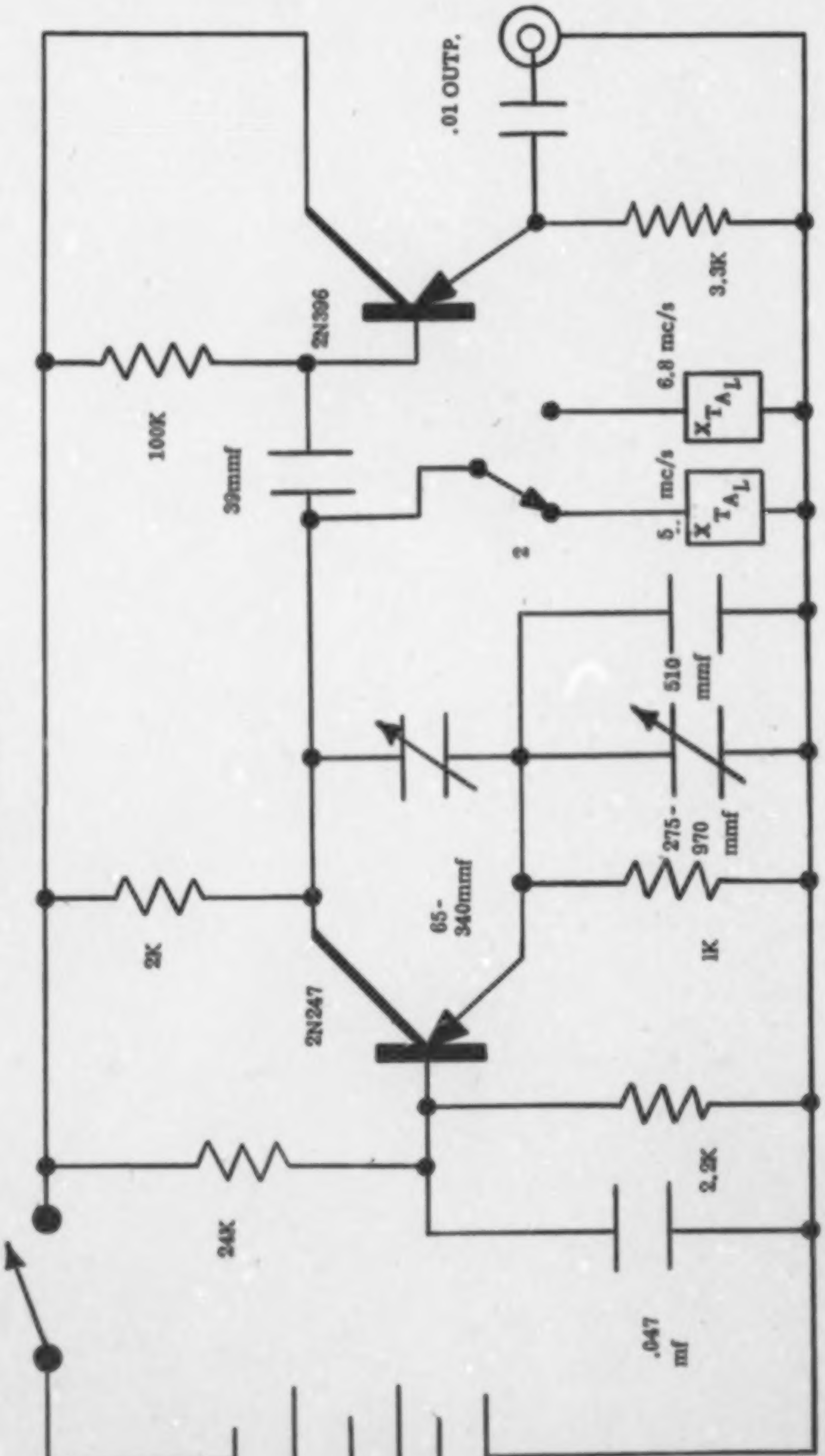
STANDARD LOW PASS FILTER FOR S/N MEASUREMENT

Note: All coils are Northill Products

C_1 = .12 mf
C_2 = 612 mmf
C_3 = 918 mmf
C_4 = 865 mmf
C_5 = 505 mmf
C_6 = 592 mmf
C_7 = 572 mmf

FIGURE 4

CRYSTAL CALIBRATOR


.01 OUTP.
2N396
3.3K
100K
39mmf
6.8 mc/s
XTAL
5 mc/s
XTAL
2
510 mmf
275 - 970 mmf
65 - 340mmf
2K
2N247
1K
2.2K
24K
.047 mf
9V.
-
+

RESULTS OF SURVEY

A SURVEY OF TELEVISION EQUIPMENT AND FACILITIES USED FOR PURPOSES OF INSTRUCTION BY PUBLIC SCHOOLS, COLLEGES AND UNIVERSITIES

It would be most gratifying if the results of this study would illuminate the problems confronting both educators and their interested associates in the utilization of television in the instruction process. Expedient measures need to be taken to supply the impetus television needs to help make the American educational system equal to the demands of the nuclear age; one that the whole world would want to imitate! Television, like nuclear power, is understood by so few. Its strength as a communication medium, its influence on people as well as its impact on social cultures of the world at large have enormous implications. On the eve of international television, these are most perplexing considerations.

This study is meant to enumerate the kinds and quantities of problems encountered in the use of television in education. An attempt is made to equate, as realistically as possible, the present state of the art and the contemporary corollaries to the use of television in education. The hypotheses are the convictions of the Director and are based on the relevant facts collected.

The success of a television operation hinges on the correct choice of equipment, programming, employees, public relations, and governing bodies both political and policy determining. The tolerance or acceptance by viewing bodies is a reflection on the application of the communication arts.

The opening of the school term in September, 1956 marked the beginning of a five year experimental television project by the Board of Education, Hagerstown, Maryland. The purpose of the experiment is to determine how an educational institution might use television in the educational processes of a school administration. The experiment, under direction of Dr. William M. Brish, Superintendent of Schools, Washington County, Hagerstown, Maryland, is intended to be of wide scope and interest; a kind of national laboratory situation whereby extensive use of television equipment and a county school system is investigating the feasibility of television as a means of direct instruction.

The cooperation of the Chesapeake and Potomac Telephone Company of Maryland provides a unique type of distribution system employing six radio frequency television channels over a closed-circuit installation. The program as envisioned is a development which grew from a local distribution (over the city of Hagerstown, Maryland - a city of approximately 40,000 population) to a county-wide distribution system, reaching schools throughout 672 square miles in Washington County, Maryland. This development encompasses a progressively increasing service area, now serving over 40 schools.

The Washington County School system supplied teachers for the program (now numbering 24), cooperation and assistance to achieve the maximum by the culmination of the five year term. Dr. William M. Brish added but two key personnel to his staff with the purpose of maintaining much of the typical educational atmosphere of the ordinary school adminstration. Mr. Stanley Johnson, Graduate of the Syracuse University, New York, Professional College of Communications and Mr. John R. Brugger, Chief Engineer, University of Illinois Broadcasting Services, Urbana, Illinois, were employed in September, 1956. The remainder of the staff has familiarized themselves with the various aspects of television through study, experimentation, visits to observe other operations and workshops.

The termination of the third year of operation indicated sufficient success and progress to interest the attention of administrative officers of the U. S. Office of Education. In the interests of executing the National Defense Education Act of 1958 and upon the recommendation of Dr. C. Walter Stone, Director, Mass Media Branch, United States Office of Education, the Board of Education, Hagerstown, Maryland, was awarded a contract to pursue the study as outlined previously in this report. Mr. John R. Brugger qualified as Director of the study by virtue of his interests, experiences and background.

The procedure followed by the Director was to activate a program whereupon a schedule of visits and the compilation of data would provide the necessary information to complete the study indicated in the contract. Even though the purpose of the contract can be interpreted as very broad in scope, it is evident the study is meant to draw upon the diversified elements and factors which are, in total, the facility required of a television operation. This study proposes to bring together these various elements which are preeminent in the successful television operation, namely, the necessary equipment, methods and personnel.

The Director prepared a schedule of information which was to be collected from the various operations to be visited. The data collected represent the essentials to execute an "on-going" operation. The Director evaluated installations and exchanged experiences with operators, solicited recommendations and discussed their inadequacies, unsatisfactory experiences and difficulties. Visits were made to various sizes and types of operations in order to determine the common problems and find the basic elements necessary to meet the minimal equipment requirements. Many of the typical experiences witnessed at institutions exist in the operation at Hagerstown, Maryland, which represents one of the most intensive and extensive television, educational or commercial, operation anywhere in the continental limits of the United States and likely in the world. These techniques are incorporated and expressed in this report.

The final requirements of the contract were substantially fulfilled in a conference (Appendix A) which was held near the termination of the contract, wherein approximately twelve people were selected representing the many diversified types of operations across the nation. This conference was designed to draw upon the professional knowledge, experience and travels of the participants covering the various aspects of the field of educational television.

Institutions Visited

1. Alabama Educational Television Commission
807 Protective Life Building
Birmingham 3, Alabama

2. Station WBIQ - Channel 10
Birmingham Area Education TV Association
Birmingham, Alabama

3. Anaheim City Public Schools
Television Department
412 E. Broadway
Anaheim, California

4. Arizona State University
Radio-Television Department
Phoenix, Arizona

5. University of Arizona
KUAT-TV
Herring Hall
Tuscon, Arizona

6. Case Institute of Technology
Television Department
10600 Euclid Avenue
Cleveland, Ohio

7. Central Washington College
Office of Visual Education
Ellensburg, Washington

8. Chelsea Closed Circuit TV Project
436 West 27th Street
New York 1, New York

9. Courtland Public Schools
Television Department
Courtland, New York

10. Dade County Schools
WTHS-TV
1410 N.E. 2nd Avenue
Miami, Florida

11. Idaho State College
Institute of Technology
Television Department
Pocatello, Idaho

12. Jefferson County Public Schools
Educational Television Project
Clarendon & Spencer Streets
Louisville 5, Kentucky

13. KDPS-TV
1800 Grand Avenue
DesMoines, Iowa

14. Keene High School
Audio-Visual Department
Keene, New Hampshire

15. Kent State University
Television Department
Kent, Ohio

16. KETA-TV
1901 North Ellison Street
Oklahoma City, Oklahoma

17. KETC-TV
6996 Millbrook
St. Louis, Missouri

18. KQED-TV
525 4th Street
San Francisco, California

19. KRMA-TV
13th & Glenarm
Denver, Colorado

20. KVIE-TV
Box 1882
Sacramento 9, California

21. Miami University
WMUB-TV
Oak at Spring Street
Oxford, Ohio

22. Montana State University
School of Journalism,
University Studios,
Missoula, Montana

23. Ohio State University
WOSU-TV
Columbus 10, Ohio

24. Oklahoma City Public Schools
KOKH-TV
Oklahoma City, Oklahoma

25. Oregon State College
TV Committee, Department of Speech
Corvallis, Oregon

26, Oregon Technical Institute
Department of Electronics Technology
Klamath Falls, Oregon

27. Patrick Henry Elementary School
735 Penbrook Street
Norfolk, Virginia

28. Parma Senior High School-TV
West 54th. Longwood Avenue
Parma (Cleveland 29), Ohio

29. Pennsylvania State University
Television Department
University Park, Pennsylvania

30. Purdue University
Television Unit
Lafayette, Indiana

31. Richardson Ind. School Dist.,
KRET-TV
450 Abram Street
Richardson, Texas

32. San Diego State College
Television Department
San Diego, California

33. San Jose State College
Television Department
San Jose, California

34. South Dakota State College
Television Department
Brookings, South Dakota

35. Stephens College
Television & Radio Department
Columbia, Missouri

36. University of Georgia
WGTV-TV
Athens, Georgia

37. University of Illinois
WILL-TV
234 Gregory Hall
Urbana, Illinois

38. University of New Mexico
KNME-TV
1801 Roma Avenue NE
Albuquerque, New Mexico

39. University of Nebraska
KUON-TV
12th & R Streets
Lincoln, Nebraska

40. University of Michigan
Television Center
310 Maynard Street
Ann Arbor, Michigan

41. University of Missouri
Television Department
Highway 63 - South
Columbia, Missouri

42. University of North Carolina
WUNC-TV
Chapel Hill, North Carolina

43. University of Notre Dame
WNDU-TV
P. O. Box 989
South Bend, Indiana

44. University of Oregon
KOAC-TV
Eugene, Oregon

45. University of South Dakota
Radio-Television
Vermillion, South Dakota

46. University of Texas
Radio-Television Department
Austin 12, Texas

47. University of Utah,
KUED-TV
101 Music Hall
Salt Lake City, Utah

48. University of Washington
KCTS-TV
Seattle 5, Washington

49. Washington County Schools
Board of Education
Television Department
Hagerstown, Maryland

50. WCET-TV
2222 Chicksaw Street
Cincinnati 19, Ohio

51. WGBH-TV
84 Massachusetts Avenue
Cambridge 39, Massachusetts

52. WHYY-TV
1622 Chestnut Street
Philadelphia 3, Pennsylvania

53. WKNO-TV
268 Jefferson Avenue
Memphis 3, Tennessee

54. University of Houston - KUHT-TV
3801 Cullen Boulevard
Houston 4, Texas

55. WMVS-TV
1015 N 16th Street
Milwaukee, Wisconsin

56. WQED-TV, WQEX-TV
4337 Fifth Avenue
Pittsburgh 13, Pennsylvania

Tabulated Results

1. 56 institutions using television for purposes of instruction were visited.

Distribution

2. 14 operate a licensed VHF station.
3. 8 operate a licensed UHF station.
4. 3 operate more than one licensed broadcast transmitter.
5. 4 operate a licensed station and translators and/or satellites.
6. 5 program via local commercial stations.
7. 16 operate a closed-circuit system (single or multiple radio frequency channels.
8. 4 operate a video closed-circuit system.
9. 7 operate a closed-circuit system in conjunction with a licensed station.
10. 7 operate a closed-circuit system and use local commercial station facilities (or are commercially licensed educational institutions).
11. 6 use two-way talk systems (to talk from viewing area to the studio).
12. 5 use leased closed-circuit facilities.

Studios

13. 5 use non-professional vidicon studio cameras.
14. 21 use professional vidicon studio cameras.
15. 31 use image orthicon studio cameras.
16. 1 uses color cameras (medical).
17. 10 use iconoscope film cameras.
18. 37 use vidicon film cameras.
19. 10 use shadow boxes or studio screens for film projection entirely or supplementary film pick-up.
20. 21 have 1 studio.
21. 18 have 2 studios.
22. 3 have 3 studios.
23. 1 has 4 studios.
24. 5 have 5 studios.
25. 16 originate in classrooms, auditoriums or other.
26. 1452 square feet is the average studio size.
27. 2400 square feet is the minimum studio size recommended by experienced operators.
28. 6 1/2 hours is the average length of time studio facilities are used per day during the school term.
29. 5 is the average number of days per week of operations.
30. 4 use local commercial studios and transmitting facilities.
31. 17 use remote originations with frequency.
32. 12 utilize microwave transmitters to relay programs to transmitting facilities.
33. 5 do not use professional standards with studio equipment.

34. 23 report adequate studio and control room space.
35. 31 report inadequate space requirements (studios and subordinate areas) for their operation.
36. 46 use standard television studio lighting practices.
37. 10 were observed to be using marginal or inadequate lighting.
38. 3 use mercury vapor or fluorescent lighting (in total or part) for scene lighting.
39. 45 employ cameramen to manipulate studio cameras.
40. 3 control cameras remotely (pan and tilt).
41. 29 report current studio television equipment design equals or exceeds requirements for todays uses by educators.
42. 19 report need for newly designed equipment and facilities for greater flexibility and simplicity.
43. 26 operators recommend a study to determine new designs for equipment.
44. 42 report they would be satisfied with improved models of current designs (no major change in production line).
45. 14 report lack of control in procurring precisely the equipment desired (due to price differentials and institution purchase policies).
46. 32 find financial problems dictate facility compromises.

Receivers and viewing areas

47. 6 recommend other than standard television receivers.
48. 4 recommend the need for larger screens than is available in standard receivers.
49. 5 prefer large screen projection systems over TV receivers.
50. 5 use large screen projectors (theatre or auditorium projectors).
51. 46 use conventional television receivers with satisfaction.
52. 16 complain of inadequate audio systems in their otherwise satisfactory receiver performance.
53. 35 complain of light interferences on picture display.
54. 35 complain of interference from window (sun) light.
55. 34 report interference from indoor light fixtures.
56. 35 report acoustics in class (viewing areas) a problem which needs attention.
57. 37 recommend better ventilation and/or air conditioning in viewing areas.
58. 35 desire methods of controlling light (indoor and outdoor) in classrooms.
59. 38 suggest TV receiver specifications to their respective purchasing representatives or cooperative organizations.
60. 15 report no cooperation (or control) over television set purchases.
61. 28 maintain their TV receivers used by cooperative organizations.
62. 25 report no cooperation (or control) over television set purchases.
63. 0 report maintenance costs excessive.
64. 12 report TV sets in operation are serviced by commercial servicemen.
65. 14 report no contact with viewing (class or audience groups as to set maintenance costs etc.)

66. 34 suggest at least one TV receiver for each 20 - 35 viewers (during telecast).

67. 54 report irregular viewing situations; as few as one person to a set to several hundred viewing in an auditorium with a dozen or more sets scattered. No fixed pattern.

Recording

68. 23 have kinescope (film) facilities.

69. 29 use videotape recorders.

70. 34 use recorded programs (made locally) for evaluation of methods, teaching, teacher and content.

71. 32 repeat locally recorded programs for supplementary purposes.

72. 31 repeat locally recorded programs for schedule management.

73. 33 exchange or supply recorded programs from other institutions and organizations.

74. 44 receive recorded programs from other institutions and organizations.

75. 11 have film processing facilities (fast processors within operation).

Design

76. 45 designed their own system with their staff and personnel.

77. 45 completed their own installation with their staff and personnel.

78. 34 decided on equipment basically on cost factors.

79. 6 purchased their equipment irrespective of cost factors.

80. 44 report technical facility operated to be adequate for intended use.

81. 25 report need for more equipment to perform responsibilities.

82. 19 report inability to achieve technical proficiency because of lack of funds (to procurr needed personnel and/or equipment).

83. 41 proclaimed the technical staff adequate in ability and quantity.

84. 12 operations are in technical difficulty for lack of (1) equipment, (2) professional ability and/or (3) financial support.

85. 34 offered design considerations for improving technical equipment.

86. 43 recommended appropriate architectural design improvements in new or rennovated building construction.

87. 40 recommended conduit for new buildings to be used for multiple TV viewing rooms.

88. 42 recommended a study of classroom environmental conditions (light, acoustics, floor treatment, built in TV etc. for use of all learning devices).

Program

89. 41 report the use of grants used to implement operation and/or programming.

90. 35 report financial problems.

91. 33 program for in-school students (grades 1 to 12 level).

92. 35 telecast for college level students.

93. 17 offer courses in TV production.

94. 31 offer adult education courses.

95. 25 program supplementary education.

96. 32 program direct instruction as part of regular activities (beyond supplementation).

Personnel

97. 44 report teachers need special education in effective use of television.

98. 46 recommend formal education for teachers at the college (undergraduate) level.

99. 34 desire the teaching team approach.

100. 45 report the need for professional people in most of a TV operation.

101. 38 use professionally trained director-producers.

102. 6 use non-professionals on their staff to a large extent (other than teacher-professor, administrator and engineer).

103. 10 employ non-professional artists.

104. 14 report the need for personnel experienced in staging and lighting.

105. 38 report classroom teachers need orientation on how to best use telecasts received.

106. 43 are satisfied with student learning via television.

107. 22 emphasized TV teachers should devote full time to TV and be relieved of other teaching assignments.

New developments

1. Ampex Corporation and Radio Corporation of America (RCA) are each introducing new videotape recorders which are estimated to cost under $10,000.00. These will serve many purposes in educational television.

2. Common Carriers are installing supplementary message services in various areas. These include video transmission facilities. Oakland, Cumberland, Hagerstown and Baltimore, Maryland, will have such services in the near future. Nine communities in South Carolina now operate an intercity microwave leased service. Closed-circuit systems distribute the intercity service to fifteen educational systems. Developments of this kind offer interstate video services for network programming.

3. Solid state and transistor developments indicate improved closed-circuit services at lower costs.

4. Philco Corporation of Philadelphia intends to market low cost professional vidicon cameras which are largely automated and feature transistorized circuitry.

5. Rensselaer Polytechnic Institute, Troy, New York, is doing a research project studying classroom environmental control. This includes lighting, floor and wall covering and acoustics.

6. San Jose State College, San Jose, California, is studying the use of an electronic instrument to test student participation during telecasts.

7. Large screen projectors are being improved. Ediphor and Teleprompter are promoting new designs for black and white as well as color service.

8. Imported video products are being introduced. Battery operated television receivers and videotape recorders have been reported.

9. The design of a thermo plastic videotape recorder has been announced by General Electric. No date of marketing has been defined. The cost of the product is likewise undefined.

Observations:

Results of on-site visits were most productive when the conversation was guided by an ad-lib procedure with no direct reference to a check-list or interview schedule. When it was indicated the information sought was to be recorded, reactions were pre-meditated, sometimes evasive and there was evidence of a search for reserved opinions rather than actual experiences of the interviewee.

Best results from on-site-visits came from two, three or four people sitting down together and chatting about the business at hand without an attempt to formalize written fixed answers to the type of information sought. It was, however, a guided conversation.

It must be remembered that television equipment was not designed for educators, nor does it necessarily meet their needs. The concept of fitting television to teaching has prevailed in most quarters. It is evident that teaching methods must also be customized tc utilize the medium. These skills or procedures need considerable study and experimentation, along with scientific evaluation of results obtained. Greater achievements will come with the use of television when more is understood in the area of how a learner learns.

Television is still on probation in the eyes of many educators. There remains an air of tolerance for the medium by many teachers and students. Evidence reveals that much improvement must be shown in the use (production methodology) of television. There must be a better understanding of the communication process; that is, the use of the media. A perfect example comes to mind in the process of transcribing the Hagerstown Conference. It is impossible to "read out" the atmosphere which prevailed in the meeting. The discussions were recorded via tape and then transcribed. The provocative challenges presented and discussed were treated substantially, but the transcribed manuscript seems so subtle and in places even void. It is impossible to write the spoken word to retain inflection, pacing, pauses, gestures and physical expressions experienced in the seeing and hearing process. Skills in the use of television lack similar elements of continuity.

There is a disparity in the use of television terms. Definitions need to be established to assist in an understanding. For example, ITV, ETV: Director, Producer; Direct teaching, Supplemental teaching; Teacher, Talent; Instruments of communication, Teaching tools; Visual aids, Graphic arts; Coordinator, Supervisor; Staging, Show; Show, Instructional TV; Telecast, Tele-lesson; Program, Instructional TV; etc. In general, there needs to be a complete adoption or rejection of equivalent terms in allied fields. Perhaps the administrative organizations should make a study to determine where certain authorities lie, then define terms appropriately.

Evidence from this survey indicates that the technical facility of television is quite adequate in the minds of educators working with the medium. Further investigation by educators may reveal that variations of technical equipment may permit greater utilization of television in terms of more learning on the part of the viewer. Practically no critical short comings were reported as inherent of current equipment designs. General criticisms are that television equipment costs too much and is too complex.

To summarize; Mr. Gerald J. Willsea, Director of Radio and Television, Denver Public Schools, Denver 2, Colorado, has written so candidly:

> "It is difficult to revise a formula relating to every aspect of television, whether equipment, personnel, pay, or whatever, that will be completely applicable to all stations or operations.
>
> "Regardless of what formula concerning these items is developed, the drive for content and good quality should be the topmost concern of all associated personnel.
>
> "The day when television specialists invade the realm of content specialists is passing. The time when the television director or television producer could be all things to all people (in the majority of cases) has gone. This is a realization that is difficult to come to, but to expect to receive the optimum cooperation from curriculum committees, school administrators, college and university departments and other instructionally oriented persons, television people must include them in the plans and make them feel that they are a part of the team.
>
> "The beginnings of a breakdown in a rather rigid kind of local prejudice can be detected. This is a thing 'devoutly to be wished.' One of the deterrents in the exchange of instructional television programs has been the matter of local pride; almost disdain. It is good to see, on a national level that there are programs which are being bicycled around and are quite acceptable to local committees, regardless of where the series had been produced."

Recommendations

1. A continued study of the use of television with all associated media.
    - a. Evaluation of the effectiveness of various presentation techniques, (1) use of demonstration materials, (2) the kind of word description which should accompany picture information and vice-versa, (3) how to hold student attention and effect maximum interaction between teacher (studio) and student, (4) electronic methods of checking on student reaction, and (5) methods of attaining demonstration materials for various ideas and principles.
    - b. When and how to produce educational TV which will be more acceptable to the audience.
    - c. Match the great variety of educational needs appropriately with variable equipment systems.
2. A study of demonstration equipments (teaching machines) to provide studio teachers with appropriate aids.

3. Research people to concentrate on the various effective methods of using film, live teaching, pictures, print, etc., integrated for the best use in learning situations in television.

4. Studio facilities need to be evaluated.

    a. Most efficient size, dimension, configuration and acoustical treatment for economical practicality.

    b. Appropriate methods and materials for effective staging.

    c. Psychological importance (to studio teacher and viewer) of attractive, meaningful backdrops or set properties, integrated with useful, purposeful, mechanical and artistic supporting or primary interest objects (or materials) including the effects of color (in monochrome and chromatic telecasting).

    d. Size and location of supporting or complementary service areas.

        (1) Storage space.

        (2) Shops, planning and study areas.

        (3) Numbers and talent of personnel necessary as subordinates to the teaching by television process.

    e. Ratio of quantity of duplicate facilities to number of telecasts manageable.

    f. Effect of color contrasts in black and white (monochrome service) and color transmissions.

    g. The relative importance to the viewer of the quality of the video signal as viewed on various display devices.

    h. The relative comparisons of various video cameras as to their acceptability and influence on the learning by viewing groups.

        (1) Image orthicon color.

        (2) Vidicon color.

        (3) Image orthicon 4 1/2 inch, black and white.

        (4) Image orthicon 3 inch, black and white.

        (5) Professional vidicon.

        (6) Industrial vidicon.

    i. The importance of artistic production techniques to the learner.

        (1) Effectiveness of various practices.

        (2) Equipment required to achieve the most desirable techniques.

    j. Technological developments to effect low cost video recording media.

    k. Development of appropriate two-way communication system to facilitate the student learning process, via television, in dispersed groups.

    l. More compact and less expensive video cameras and television equipment.

5. Transmission areas suggest these investigations.

    a. Narrow band transmission techniques under study by Columbia Broadcasting System Laboratories in conjunction with Airborne television, Purdue University, Lafayette, Indiana.

        - (1) Necessary FCC acceptance and approval needed.
        - (2) Technical capabilities of narrow band.
        - (3) Conservation of frequency spectrum.
    - b. Drop-in services to utilize VHF channels in regions not now serviced via co-channel stations. Low power, low coverage restrictions.
    - c. Commercial station cooperation with educational administrators in programming.
        - (1) Alleviates financial burden of educators.
        - (2) Adds educational television service to community.
    - d. Feasibility and economic practicability of multiple transmitters.
    - e. Utilization of satellites and translators.
    - f. More extensive use of closed-circuit installations.
        - (1) Transmission improvement by cable developments.
        - (2) Design and performance improvements of amplifier characteristics.

6. Television receiver design modifications suggested.
    - a. Improved DC restoration to provide better picture contrast.
    - b. Improved audio fidelity and power.
    - c. Larger picture tubes.
    - d. Increased sensitivity, selectivity and stability in overall receiver performance.
    - e. Easier access to components and circuitry for servicing.
    - f. Pre-tuning or pre-set channel tuning to eliminate need for fine tuning after selection of each channel.
    - g. Improved picture tube characteristics for better resolution, contrast, brightness and provision for reduced impairment of picture from external bright light sources.
    - h. Receivers adaptable to wall mounting with remote tuning controls, study desks with receivers built in for dormitory or study hall type installations.
        - (1) Controls and components so arranged to provide ease in servicing.
        - (2) Design of special transmitting and receiving equipment for lower spectrum useage (such as 15 megacycles to 90 megacycles range).
        - (3) Variable height supports to permit the display tube to be adjusted to heights ranging from 30 inches to approximately 60 inches.

i. Improved models of large screen video projectors, including color, incorporate several modifications.

   (1) Reduction in radiation danger from high voltage used.

   (2) Reduction in complexity of operating controls.

   (3) Screen brightness (picture contrast) improvement to operate in other than darkened areas.

j. Optional features are available for television receivers.

   (1) Provision for locking controls with cover and key.

   (2) 75 ohm input for RF, unbalanced; 75 ohm loop-through video signal input; low level audio input, low impedance, balanced; appropriate switching to select RF or video input.

   (3) Heavy duty AC cordage equipped with 3-wire polarized plug.

   (4) VHF and UHF tuning.

   (5) Unitized sub-chassis assemblies for convenient servicing.

   (6) Transformer power chassis to reduce electrical and servicing problems.

   (7) Cabinets which are complimentary to good audio speaker function. Speakers should be front mounted.

   (8) All controls conveniently located for adjustment.

   (9) Automatic gain control amplification of the RF section.

   (10) Tube saver to function when the set is turned on to reduce tube burn out.

   (11) Adequate protection from electrical shock hazard.

7. Requirements for improved architectural design and construction favorable to television for viewing rooms include several recommendations.

   a. Control of light sources in both intensity and directivity in viewing areas.

   b. Acoustical treatment compatible with sound control for improved listening effectiveness.

   c. Installation methods of equipment pertinent to classroom instruction.

      (1) Television viewing devices.

      (2) Subordinate facilities used in conjunction with instructional television.

   d. Room size and variations for optimum utilization of space and personnel integrated with the use of television.

   e. Psychological effect of various classroom environmental situations.

8. A task force is desperately needed to correlate the wisdom, research data and experiences of the educators, psychologists, design engineers, architects, research specialists and communication specialists to do some "human engineering." This task force must formulate the most practical ingredients to bring the education process into proper perspective so that mankind may share the many values of our heritage with new generations.

APPENDIX D

MANUFACTURERS OF TELEVISION EQUIPMENT

Company	Address
Adler Electronics, Inc.	One LeFevre Lane New Rochelle, N.Y.
Admiral Corporation	3800 Cortland Street Chicago 47, Illinois
American Optical Co.	Buffalo 15, N. Y.
Ampex Corporation	934 Charter Street Redwood City, Calif.
Amperex Electronic Corp.	P.O. Box 418, 230 Duff Ave. Hicksville, L. I., N. Y.
Amphenol Electronics Corp.	1830 South 54th Avenue Chicago 50, Illinois
Amplitel Inc.	342 W. 40th Street New York 18, N. Y.
Andrew Corporation	363 East 75th Street Chicago 19, Illinois
Ariel Davis Mfg. Co.	3687 South State Street Salt Lake City, Utah
Belden Manufacturing Company	4647 West Van Buren Street Chicago 44, Illinois
Bell & Howell Company	7100 McCormick Road Chicago 45, Illinois
Bendix Radio (Bendix Aviation)	East Joppa Road Baltimore 4, Maryland
Blonder-Tongue Labs., Inc.	526 North Avenue Westfield, N. J.
Centruy Lighting Inc.,	521 W. 43rd Street New York 36, N. Y.
Chesapeake & Potomac Tel. Co. of Maryland	320 St. Paul Place Baltimore 2, Maryland

Company	Address
Claremont Tube Co.	36-02 35th Avenue Long Island City 6, N. Y.
Collins Radio Company	855 35th Street, N.E. Cedar Rapids, Iowa
Columbia Broadcasting System	561 W. 56th Street New York, N. Y.
Community Engineering Corp.	Box 824 State College, Pennsylvania
Conrac, Inc.	19217 East Foothill Blvd. Glendora, California
Dage TV Division Thompson Products, Inc.	West 10th Street Michigan City, Indiana
Diamond Power Specialty Corp.	Lancaster, Ohio
Allen B. DuMont Labs., Inc.	524 W. 23rd Street New York 11, N. Y.
DuKane Corporation	St. Charles, Illinois
Eastman Kodak Company	343 State Street Rochester 4, N. Y.
Electro-Voice, Inc.	Carroll and Cecil Streets Buchanan, Michigan
Elgin Metalformers Corp.	630 Congdon Avenue Elgin, Illinois
Emerson Radio & Phonograph Corp.	14th and Coles Streets Jersey City 2, N. J.
Entron, Inc.	Box 287 Bladensburg, Maryland
Farnsworth Electronics Corp. International Telephone & Telegraph Corp.	67 Broad Street New York 4, N. Y.
Foto-Video	Eagle Rock Bldg., 25 Amity St. Little Falls, N. J.

Company	Address
Gates Radio	Quincy, Illinois
General Electric Company	Electronics Park Syracuse 1, New York
General Electrodynamics	4430 Forest Lane Garland, Texas
General Cement Mfg. Co.	400 S. Wyman Street Rockford, Illinois
General Precision Lab., Inc.	63 Bedford Road Pleasantville, New York
General Radio	275 Massachusetts Ave. Cambridge 39, Massachusetts
Graflex, Inc.	154 Clarissa Street Rochester 8, N. Y.
Hickok Electrical Instrument Co.	10514 Dupont Ave. Cleveland 8, Ohio
Hoffman Electronics Corp.	3761 S. Hill Street Los Angeles 7, Calif.
Hotpoint Division, General Electric Co.	Electronics Park Syracuse 1, N. Y.
International Resistance Co.	401 N. Broad Street Philadelphia 8, Pa.
Jackson Electrical Instrument Co.	18 South Patterson Blvd. Dayton 2, Ohio
Jensen Mfg. Co.	6601 S. Laramie Avenue Chicago 38, Illinois
Jerrold Electronics Corp.	15th Street & Lehigh Ave. Philadelphia, Pa.
Kay Electric Co.	14 Maple Ave. Pine Brook, N. J.
KinTel (Kay Labs.) Division Cohu Electronics	5725 Kearny Villa Road San Diego 11, Calif.

Company	Address
Kliegl Brothers, Inc.	321 W. 50th Street New York 19, N. Y.
Litton Industries	336 N. Foothill Road Beverly Hills, Calif.
Machlett Laboratories, Inc.	1063 Hope St. Springdale, Conn.
The Magnavox Co.	2131 Bueter Road Fort Wayne 4, Indiana
P. R. Mallory & Co., Inc.	3029 East Washington Street Indianapolis 6, Indiana
Maxson Instruments	47-37 Anstell Place Long Island City 1, N. Y.
McIntosh Laboratory, Inc.	320 Water St. Binghampton, N. Y.
Measurements Corporation	Boonton, N. J.
Meilink Street Safe Co.	901 Livernois Street Ferndale 20, Michigan
Minnesota Mining & Mfg. Co.	900 Bush Avenue St. Paul 6, Minnesota
Miratel, Inc.	1080 Dionne Street St. Paul 13, Minnesota
Motorola Inc.	Dept. 80 4545 Augusta Blvd. Chicago 51, Illinois
Packard Bell Electronics Corp.	12333 West Olympic Blvd. Los Angeles, Calif.
Perkin-Elmer Corp.	Norwalk, Connecticut
Philco Corporation	G & I Division 4700 Wissahickon Avenue Philadelphia 44, Pa.
Polaroid Corp.	Cambridge 39, Mass.
Precision Electronics Inc.	9101 King St. Franklin Park, Illinois.

Company	Address
Prodelin Inc.	307 Bergen Ave. Kearney, N. J.
Raytheon Mfg. Co.	Waltham 54, Mass.
John R. Rider Publisher Inc.	480 Canal St. New York 13, N. Y.
Howard W. Sams & Co., Inc.	2201 East 46th Street Indianapolis 6, Indiana
Sarkes Tarzian, Inc.	East Hillside Drive Bloomington, Indiana
Sears-Roebuck Co.	6 N. Potomac Street Hagerstown, Md.
Shure Brothers, Inc.	222 Hartrey Avenue Evanston, Illinois
Simpson Electric Co.	5208-16 W. Kinzie St. Chicago 44, Illinois
Spencer-Kennedy Labs., Inc.	1320 Soldiers Field Road Boston 35, Mass.
Sprague Electric Company	87 Marshall Street North Adams, Mass.
Standard Electronics Corp.	29-01 Warden Ave. Long Island City, N. Y.
Sylvania Electric Products Inc.	1740 Broadway New York 19, N. Y.
Superior Electric Company	Bristol, Connecticut
Tektronix Inc.	Box 831 Portland, Oregon
Telechrome Inc.	28 Ranick Drive Amityville, N. Y.
Television Utilities Corp.	Colonial Avenue Corona 68, N. Y.

CONFIDENTIAL CRITIQUE*

1. WHAT EQUIPMENT MANUFACTURERS HAVE THE MOST SATISFACTORY POLICIES AND PRACTICES ON EQUIPMENT WARRANTY, EXCHANGE, REPLACEMENT, ETC.?

Policies among various manufacturers of television equipment are quite uniform. However, great differences in service are reflected by local representatives. Energetic and eager sales engineers serving as local representatives display varied ability and interest in negotiating on the behalf of the manufacturer. It has been established that without the aid of a local representative, communication is the greatest difficulty between the user of equipment and the manufacturer. Often it is a matter of finding the right executive or official to get decisions on adjustments, whether on equipment warranty, replacement, technical design difficulty or other liability of the manufacturer. Since the business of television is usually one of expediency - time is of the essence. It is mandatory that a client receive immediate attention in matters of replacement, equipment modification or appropriate field service with minimum time loss.

In reporting this difficulty to manufacturers concerning negotiations on equipment adjustments, seldom is it apparent that administrative action has improved the situation. This is an experience that has been observed over a period of time and is substantiated by operators in the field.

Based on experiences in Hagerstown, Maryland, the most cooperative manufacturers would be listed in this order. Among manufacturers of television studio equipment, Radio Corporation of America, (RCA), Camden, New Jersey; Sarkes Tarzian, Bloomington, Indiana; Dage Corporation, Michigan City, Indiana; and General Precision Laboratories (GPL), Pleasantville, New York. Cooperation has been very satisfactory from Jerrold Electronics, Philadelphia, Pennsylvania, Entron, Bladensburg, Maryland, and Spencer Kennedy Laboratories, Boston, Massachusetts, in matters of distribution systems. Motorola of Chicago, General Electric of Syracuse, New York and RCA, Camden, New Jersey, have been very accommodating in television receiver service.

It is imperative to point out that some manufacturers may not have been called upon for extended or extra service, and therefore, this report is not meant to exclude others from a "favorable" list. It should also be mentioned that Hagerstown, Maryland, was set up on a voluntary basis, and approximately 75 manufacturers displayed interest and cooperation by supplying equipment on a "no charge" basis.

2. IN THE VARIOUS CATEGORIES AND BRANDS OF EQUIPMENT, WHAT IS THE CONSENSUS AMONG USERS AS TO THE "BEST BUYS"?

Evidence from the institutions visited reflect the following popularity of major equipment. The most popular manufacturer is listed first for the various equipments.

---

*Opinions of the writer substantiated by reports from field operatiors.

a. Cameras - RCA, Sarkes Tarzian, Dage, GPL, General Electric (G.E.), Kintel.

b. Receivers - RCA, Motorola, G.E., Philco, Admiral, Westinghouse, Transvision.

Equal popularity was indicated among DuMont, Emerson, Hoffman, Hotpoint, Magnavox, Packard-Bell, Sylvania, Zenith.

Specialized but excellent receivers are Conrac and Setchel Carlson. Setchell-Carlson produces a unitized chasis model which has been highly praised because of this feature.

c. Distribution Systems - Spencer Kennedy Laboratories (SKL), Jerrold, Entron, Blonder-Tongue, and Community Engineering.

d. Transmitters - RCA, G.E.

e. Recorders - Film - GPL, RCA, Auricon (or similar models).
Tape - Ampex, RCA.

f. Lighting - Equal popularity between Kleigel and Century.
Ariel Davis Manufacturing Company markets limited types of television lighting equipment.

g. Considerations influencing selections of equipment are these.

(1) Quality design of equipment for ruggedness, dependability and ease in servicing.

(2) Technical performance characteristics and qualities.

(3) Field service policy, availability of replacement parts and field service as previously experienced

(4) Cost factors.

3. WHAT INSTALLATIONS ARE SUFFERING FROM BEING UNDER EQUIPPED IN RELATION TO THE TYPE OF OPERATION TO WHICH THEY ARE COMMITTED?

With tongue in cheek, and with no reference to action pursued by any of the institutions visited toward improving the situation, I would like to divide this question into four categories. "Under equipped" to include (a.) technical facility, (b.) personnel, (c.) critical financial inadequacy (all inadequacies reflect financial difficulties in the main) and (d.) space inadequacy. Further qualification must be stated in terms of lack of sufficient analysis of program plans; operative or anticipatory. Likewise, no analysis has been made in this study of program management; that is, how scheduling might improve technical efficiency.

a. Technical facility inadequacies were observed or reported at the following.

(1) WIBQ-TV, Birmingham, Alabama

(2) Anaheim City Public Schools, Anaheim, California

(3) KUAT-TV, Tuscon, Arizona

(4) Chelsea Closed-circuit TV Project, New York, N. Y.

(5) Courtland Public Schools, Courtland, N. Y.
(6) Jefferson County Public Schools, Louisville, Ky.
(7) Keene High School, Keene, N. H.
(8) KVIE-TV, Sacramento, Calif.
(9) Montana State University, Missoula, Montana
(10) Oregon Technical Institue, Klamath Falls, Oregon
(11) Patrick Henry Elementary School, Norfolk, Virginia
(12) Parma Senior High School-TV, Parma, Ohio
(13) Richardson Ind. School Dist., Richardson, Texas
(14) South Dakota State College-TV, Brookings, South Dakota
(15) Washington County Schools, Hagerstown, Md.
(16) WKNO-TV, Memphis, Tenn.

b. (1) Technical personnel inadequacies were observed or reported at the following.

(a) Alabama WIBQ-TV, Birmingham, Ala.
(b) Anaheim City Public Schools, Anaheim, Calif.
(c) Arizona State University, Phoenix, Arizona
(d) KUAT-TV, Tuscon, Arizona
(e) Central Washington College, Ellensburg, Wash.
(f) Chelsea Closed Circuit TV Project, New York, N. Y.
(g) Courtland Public Schools, Courtland, N. Y.
(h) Jefferson County Public Schools, Louisville, Ky.
(i) Keene High School, Keene, N. H.
(j) Kent State University, Kent, Ohio
(k) KVIE-TV, Sacramento, Calif.
(l) Montana State University, Missoula, Montana
(m) Patrick Henry Elementary School, Norfolk, Virginia
(n) Parma Senior High School-TV, Parma, Ohio
(o) Richardson Ind. School Dist., Richardson, Texas
(p) South Dakota State College-TV, Brookings, South Dakota

(2) Other personnel problems were reported in number or ability as follows.

(a) Anaheim City Public Schools, Anaheim, Calif.
(b) Arizona State University, Phoenix, Arizona
(c) KUAT-TV, Tuscon, Arizona
(d) Case Institute of Technology, Cleveland, Ohio
(e) Central Washington College, Ellensburg, Wash.
(f) Courtland Public Schools, Courtland, N. Y.
(g) Idaho State College, Pocatello, Idaho
(h) Jefferson County Public Schools, Louisville, Ky.
(i) Keene High Schools, Keene, N. H.
(j) Kent State University, Kent, Ohio
(k) KVIE-TV, Sacramento, Calif.

(l) Miami University, Oxford, Ohio
(m) Montana State University, Missoula, Montana
(n) Oregon Technical Institute, Klamath Falls, Oregon
(o) Patrick Henry Elementary Schools, Norfolk, Virginia
(p) Parma Senior High School-TV, Parma, Ohio
(q) Pennsylvania State University, University Park, Pennsylvania
(r) Richardson Ind. School Dist., Richardson, Texas
(s) South Dakota State College, Bookings, South Dakota
(t) University of New Mexico, Albuquerque, New Mexico
(u) University of South Dakota, Vermillion, South Dakota
(v) Washington County Schools, Hagerstown, Maryland
(w) WKNO-TV, Memphis, Tennessee

c. Critical financial inadequacies were reported at the following institutions.

(1) Chelsea Closed Circuit TV Project, N. Y., N. Y.
(2) Courtland Public Schools, Courtland, N. Y.
(3) Idaho State College, Pocatello, Idaho
(4) Jefferson County Public Schools, Louisville, Ky.
(5) Keene High Schools, Keene, New Hampshire
(6) KVIE-TV, Sacramento, Calif.
(7) Montana State University, Missoula, Montana
(8) Oregon Technical Institute, Klamath Falls, Oregon
(9) Patrick Henry Elementary School, Norfolk, Virginia
(10) South Dakota State College, Brookings, South Dakota
(11) University of New Mexico, Albuquerque, New Mexico
(12) WHYY-TV, Philadelphia, Pennsylvania
(13) KUHT-TV, Houston, Texas

d. Space inadequacy was reported or observed at the following operations.

(1) Alabama WIBQ, Birmingham, Ala.
(2) Anaheim City Public Schools, Anaheim, Calif.
(3) Arizona State University, Phoenix, Arizona
(4) Case Institute of Technology, Cleveland, Ohio
(5) Central Washington College, Ellensburg, Wash.
(6) Chelsea Closed Circuit TV Project, New York 1, N. Y.
(7) Courtland Public Schools, Courtland, N. Y.
(8) KDPS-TV, DesMoines, Iowa
(9) Keene High School, Keene, New Hampshire
(10) KETA-TV, Norman, Okla.
(11) KQED-TV, San Francisco, Calif.
(12) KUAT-TV, Tuscon, Arizona
(13) KVIE-TV, Sacramento, Calif.
(14) Oregon Technical Institute, Klamath Falls, Oregon
(15) Parma Senior High School-TV, Parma, Ohio
(16) Pennsylvania State University, University Park, Pennsylvania

(17) Purdue University, Lafayette, Ind.
(18) San Jose State College, San Jose, Calif.
(19) South Dakota State College-TV, Brookings, South Dakota
(20) Stephens College, Columbia, Missouri
(21) University of Illinois - WILL-TV, Urbana, Illinois
(22) University of New Mexico, Albuquerque, New Mexico
(23) University of Texas Television, Austin, Texas
(24) WCET-TV, Cincinnati, Ohio
(25) WKNO-TV, Memphis, Tenn.
(26) WQED-TV, WQEX-TV, Pittsburgh, Pa.

4. WHAT INSTALLATIONS HAVE MORE EQUIPMENT AND FACILITIES THAN ARE APPARENTLY REQUIRED FOR PRESENT OPERATION?

This is difficult to answer; I dare say no one would admit it! So often, an institution uses its total facilities only a few hours of the day. The reason for such scheduling is, the service required for schools fits into a time slot which occupies a very short operating day. Most institutions are using their facilities less than 30% of the operating (24 hour) day with shut down periods over weekends, holidays and non-school days.

I have been unable to differentiate requirements (or obligations) between closed-circuit and open-circuit television modes of operation. Both, I believe, have the same obligation to discharge. Whether the program goes on a cable or to a transmitter should make no difference, technically. The audience may be different; the convenience and advantages of one mode of distribution over the other is debatable. Nonetheless, there is but one perrogative, EDUCATION. For example, the Hagerstown operation has the same obligation as an operation in a community with open-circuit only!

I make these recommendations to any TV operation in addition to direct and supplementary instruction.

a. Greater services should be rendered by most institutions using television. Areas for supplementary activity on a community wide basis through the facilities of television, either open-circuit or closed-circuit, include:

(1) Instrumental music lessons, at nominal rates for group instruction.
(2) Fine arts study in the fields of painting, drama, dance, etc.
(3) Skills in the crafts and trades.
(4) University extension courses appropriate to the community such as agronomy, horticulture, floriculture, animal husbandary, dairy farming, fruit processing, home economics, etc.
(5) High school credit courses.
(6) College credit courses.
(7) Vocational education instruction in all fields.
(8) Commercial practices (courses in business procedures applicable to all levels of business administration).

(9) Language courses.
(10) Community services (Professional organizations such as the Bar Association, Medical Societies; public services in Civil Defense, Red Cross, United Fund, police protection, recreation, fire prevention, crop infestation,treatment, etc.).
(11) Community interest activities (Little Theatre, Sports, Town Meetings, City Band, Art Museum, Library, Historical Societies, Parent Teachers Association, County Commissioner meetings, American Association of University Women, Womens Club, etc.).
(12) Community Labor Relations (Labor and Management affairs).
(13) The community society (homes, schools and churches) functions.
(14) Business mens associations (Chamber of Commerce) style shows, talent shows, and Service Club activities, etc.
(15) Public information and public relations activities.

b. Institutions need to solicit and obtain the support of governing bodies - the boards of education, trustees, legislators, etc., to better understand the potentials which television facilities offer so that larger operating budgets can be acquired to get on with the work which is to be done! It is imperative that administrators of operational television installations get the necessary legislation to eliminate financial barriers which now stymie so many operations. Current laws which restrict term purchase contracts to two years maximum, etc. must be modified. Other laws do not allow school boards to offer adult (after regular schools hours) high school credit courses for tuition fees and forbid administrators access to (in my opinion) legitimate sources of revenue to avert the financial crises of many television operations. Education must be considered a community service desperately needing greater budgets to discharge its full responsibility. Television has displayed it is capable of contributing much toward the distribution of the wealth of educational resources in a community.

5. WHAT INSTALLATIONS HAVE THE MOST EXTENSIVE AND FLEXIBLE FACILITIES AND EQUIPMENT GIVING PROMISE OF THE GREATEST PRODUCTION POTENTIAL? CAN YOU RANK THE INSTALLATIONS VISITED IN AN APPROXIMATE ORDER OF IMPORTANCE (OR BY CATEGORIES) IN THIS RESPECT? (BY GROUPS, THE BEST FIRST.)

Group I

Closed-Circuit

Oregon State College, Corwallis, Ore.
Pennsylvania State Uni., Uni. Park, Pa.
Purdue Uni., Lafayette, Ind.
Uni. of Georgia, Athens, Ga.
Uni. of Michigan, Ann Arbor, Mich.
Uni. of Texas, Austin, Texas
Washington County Schools, Hagerstown, Md.

Open-Circuit

Alabama ETV Com., Birmingham, Ala.
Dade County Schools, Miami, Fla.
KDPS-TV, DesMoines, Iowa
KETC-TV, St. Louis, Missouri
KQED-TV, San Francisco, Calif.
KRMA-TV, Denver, Colorado
Ohio State Uni., Columbus, Ohio
Oklahoma City Public Schools, Okla.City

Closed-Circuit	Open-Circuit (Cont'd)
Group I	
	University of Georgia, Athens, Ga. University of Nebraska, Lincoln, Neb. University of Missouri, Columbia, Mo. Univ. of N. Carolina, Chapel Hill, N.C. University of Utah, Salt Lake City, Utah University of Washington, Seattle, Wash. WGBH-TV, Boston, Mass. WHYY-TV, Philadelphia, Pa. University of Houston, Houston, Texas WMVS-TV, Milwaukee, Wis. WQED-TV, WQEX-TV, Pittsburgh, Pa.
Group II	
Anaheim City Public Schools, Anaheim, Calif. Case Institute of Technology, Cleveland, Ohio Central Washington College, Ellensburg, Wash. Chelsea Closed Circuit TV Project, N.Y., N.Y. Courtland Public Schools, Courtland, N.Y. Idaho State College, Pocatello, Idaho San Diego St. College, San Diego, Calif. Stephens College, Columbia, Mo. Uni. of Illinois, Urbana, Ill. Notre Dame Uni., South Bend, Ind.	Jefferson Co. Pub. Schls., Louisville, Ky. KETA-TV, Norman, Okla. WMUB-TV, Oxford, Ohio Uni. of New Mexico, Albuquerque, N.M. Uni. of South Dakota, Vermillion, S.D. WCET-TV, Cincinnati, Ohio WKNO-TV, Memphis, Tenn.
Group III	
Arizona State Uni., Phoenix, Arizona Keene High School, Keene, N.H. Montana State Uni., Missoula, Mont. Oregon Technical Institute, Klamath Falls, Ore. Parma Senior High School, Parma, Ohio	Uni. of Arizona, Tuscon, Arizona KVIE-TV, Sacramento, Calif.

6. WHAT INSTALLATIONS ARE APPARENTLY MAKING MOST EFFICIENT USE OF THE EQUIPMENT AVAILABLE? (LISTED IN GROUPS, THE BEST FIRST.)

a. KRMA-TV, Denver, Colo.
WMVS-TV, Milwaukee, Wis.
KDPS-TV, Des Moines, Iowa
Alabama ETV Commission, Birmingham, Ala.
WTHS-TV, Miami, Fla.
WQED-TV, WQEX-TV, Pittsburgh, Pa.

b. KETC-TV, St. Louis, Mo.
KQED-TV, San Francisco, Calif.
WCET-TV, Cincinnati, Ohio
Washington County Schools, Hagerstown, Md.
KUON-TV, Lincoln, Neb.
Pennsylvania State Uni., University Park, Pa.

Oklahoma Educational Television Authority, Norman, Okla.
University of Michigan Television Center, Ann Arbor, Mich.
University of Missouri Television, Columbia, Missouri
WGBH-TV, Cambridge, Mass.
WOSU-TV, Ohio State University, Columbus, Ohio
WUNC-TV, Chapel Hill, North Carolina
KUED-TV, Salt Lake City, Utah

c. KOAC-TV, Eugene & Corvallis, Oregon
KUHT-TV, Houston, Texas
University of Georgia TV, Athens, Georgia

Note: Institutions listed represent my opinion of the best in television achievements attained and are equipped with broadcast outlets or services on a closed-circuit basis.

7. THE FOLLOWING PERSONNEL AND THEIR RESPECTIVE INSTITUTIONS WERE MOST IMPRESSIVE. EVALUATION IS BASED ON (1) EQUIPMENT OR FACILITY DESIGN, (2) OPERATION, (3) MAINTENANCE AND, (4) ADMINISTRATION.

Al Renfro, Chief Eng., Alabama ETV Com., Birmingham, Ala. 1,2, 4
J. R. Martin, Dean, College of Engineering, Case Institute of Technology, Cleveland, Ohio. 2,3,4
Robert Slingland*, Tech. Dir., Central Washington College, Ellensburg, Washington. 2,4
Herb Evans, Chief Eng., Dade County Schools, Miami, Fla. 1,2,4
William Shiflett, Dir. of Eng., Idaho State College, Pocatello, Idaho. 1,2,3
Jefferson County Public Schools, Louisville, Ky.**1,2 (Not otherwise evaluated).
Walter Alliss, Chief Eng., KDPS-TV, Des Moines, Iowa. 1,2,3,4
Dr. Leroy Cowperthwait, Director, Kent State University, Kent, Ohio (Facilities Under Development). 1 (Not otherwise evaluated).
Keith Stagg, Chief Eng., KETA-TV, Norman, Okla. 1,2,3,4
Jack Chenowith*, Chief Eng., KETC-TV, St. Louis, Missouri. 1,2,3,4
Robert Nissen, Chief Eng., KQED, San Francisco, Calif. 1,3,4
John G. Cullin, Chief Eng., KRMA-TV, Denver, Colorado. 1,2,3,4
Andrew F. Bruck, Chief Eng., WMUB-TV, Miami Uni., Oxford, Ohio. 1,2,4
Archer S. Taylor, Professor of Engineering, Montana State University, Missoula, Montana. 1, 3
Robert Gorsuch, Chief Eng., Ohio State University, Columbus, Ohio. 1,2,3,4
Clarence Deal, Chief Eng., Oklahoma City Public Schools, Oklahoma City, Okla. 1,2,3,4
Grant Feikert, Professor of Engineering, Oregon State College, Corvallis, Ore. 1,2,3,4
Lewis Cowgill, Director, A-V, Parma Senior High School-TV, Parma, Ohio. 2,4

* No longer at respective institution.
**Uses commercial station facilities.

William Pohts, Tech. Dir., Pa. State Uni., University Park, Pa. 1,2,3,4
Ralph Townsley, Chief Eng., Purdue Uni., Lafayette, Ind. 1,2,3,4
John Marino, Chief Eng., San Diego St. College, San Diego, Calif. 1,2,3,4
Ray Litke, Chief Eng., San Jose St. College, San Jose, Calif. 1,2,3,4
Eugene Kowalyshn, Chief Eng., Stephens College, Columbia, Mo. 2,3
Edward Graham, Chief Eng., Uni. of Georgia-TV, Athens, Ga. 1,2,3,4
Rob R. Beldon, Chief Eng., Uni. of Illinois, WILL-TV, Urbana, Ill. 1,2,3
Curtis Horton, Chief Eng., Uni. of New Mexico, Albuquerque, New Mexico. 2,3
Adolph Dvorak, Chief Eng., Uni. of Nebraska, Lincoln, Nebraska. 1,2,3,4
Fred Remley, Tech. Dir., Uni. of Michigan, Ann Arbor, Mich. 1,2,3,4
Bill Reagan, Chief Eng., Uni. of Missouri-TV, Columbia, Mo. 1,2,3,4
Alan MacIntyre, Chief Eng., Uni. of North Carolina, Chapel Hill, North Carolina. 1,2,3,4
Walter Stansbury, Chief Eng., Notre Dame University, South Bend, Indiana. 2,3 (Not otherwise evaluated)
Grant Feikert, Progessor of Eng., Uni. of Oregon, Eugene, Oregon. 1,2,3,4
James E. Pursha, Chief Eng., Uni. of South Dakota, Vermillion, South Dakota. 2,3
Noyes W. Willett, University of Texas, Austin, Texas. 1,2,3,4
Herbert Holtshouser, Chief Eng., Uni. of Utah, Salt Lake City, Utah. 1,2,3,4
John Bcors, Chief Eng., Uni. of Washington, Seattle, Washington. 1,2,4
John R. Brugger, Chief Eng., Washington County Schools, Hagerstown, Maryland. (Writer not desirous to evaluate himself).
James R. Leonard, Chief Eng., WCET, Cincinnati, Ohio. 1,2,4
Frank Harvey, Dir. of Eng., WGBH-TV, Boston, Massachusetts. 1,2,3,4
Sam Barbour, Chief Eng., WHYY-TV, Philadelphia, Pa. 1,2,3,4
Robert R. Nollner, Chief Eng., WKNO-TV, Memphis, Tenn. 1,2
O. C. Crossland, Chief Eng., Uni. of Houston, KUHT-TV, Houston Texas. 1,2,3
J. C. Wulliman, Chief Eng., WMVS-TV, Milwaukee, Wis. 1,2,3,4
Frank Stuckman, Chief Eng., WQED-TV, WQEX-TV, Pittsburgh, Pa. 1,2,3,4

8. IS THERE ANY COMMON DENOMINATOR IN THE TRAINING BACKGROUNDS OF THE OUTSTANDING ENGINEERS ENCOUNTERED? OR WHAT ENGINEERING TRAINING REQUIREMENTS AND WHAT OPTIMUM METHODS OF MEETING THESE DID YOU ENCOUNTER?

All of the engineering personnel holding title of supervising engineer (1) have completed degree work at the university level or (2) have had extensive training and experience in broadcasting and allied fields and (3) are capable of the many challenges confronted in the television field.

It is my opinion that the engineering staff is more capable of the day to day tasks that are confronted than other members of the television operation. This is in part due to the fact that the engineering follows a standard procedure which is much more easily defined than most other segements of operations and that, at this state of the art, known quantities and limitations are well establishea. It follows too, that most institutions have gone about the business of procurring the technical equipment first, and have "gone begging" for sufficient money to use the facility appropriately after installation is complete. To a certain degree, it is my opinion that the cost of actually sustaining an operation has not been faced realistically OR administrative people have not been able to sell programming sufficiently to obtain the necessary budget to do the job to which an operation assumes committment. It is also to be admitted that attractive and artistic programs are not "easy to come by"! The problem is accentuated by (1) lack of talented people to do the job and/or (2) insufficient know-how to utilize available people to do a program which will capture and retain an audience. These areas need considerable study and development. Back of the whole problem is, invariably, insufficient money to extend the programming.

9. WHAT SPECIFIC EXAMPLES CAN YOU CITE, IF ANY, OF INSTALLATIONS USING EQUIPMENT WITHOUT DUE REGARD FOR ITS DESIGNED CAPABILITIES?

With some reservations, Chelsea Project, New York, N. Y.; Anaheim, California; Parma High School, Cleveland, Ohio; Oregon Technical Institute, Klamath Falls, Oregon; South Dakota State College, Brookings, South Dakota.

10. WHAT NEW KINDS OF EQUIPMENT WOULD MOST INSTALLATIONS WISH TO HAVE DESIGNED AND MARKETED?

Basically, reports from educators indicate the current design of equipment is capable of all that is attempted by educational television operations. All areas might do well with such improvement as color equipment, more sensitive vidicon cameras, more sensitive receivers, better transmission (higher resolution) quality, larger display (receiver) devices and of course a lower price for everything in the way of technical equipment. Very few educators complain about the inadequacy of present television systems. Most of them are so taken up with more immediate problems and it seems to me that the areas which need concentrated study are other than the technical facility. Certainly many regard the limited quantity of open-circuit channels a barrier. This I challenge strennously; closed-circuit has many advantages for the usual applications that I can not help but wonder what forces have been working or have warped the thinking of educators to such seemingly disproportionate values. Most operators think in terms of becoming "so big so fast" that they lose the value of perspective. Most have found themselves too big along with problems which are almost insurmountable. A slower growth rate would make for many more happy operations.

11. ON THE AVERAGE, WHAT WAS THE RATIO OF ENGINEERING TIME AT THE INSTALLATIONS VISITED BEING SPENT ON MAINTENANCE AS COMPARED WITH OPERATIONAL DUTIES OF ENGINEERS?

This question has as many answers as their are engineers - almost! This depends on two factors; (1) the equipment available for maintenance and (2) the knowledge and skill of the personnel employed. Basically, other factors operate which can not be discounted. Air-conditioning and minimum stand-by units can reduce frustration and time-out-of-service problems. Stand-by units permit leisure servicing and routine maintance which make it seem as though no time is ever lost and that practically no time is spent on maintenance. Due to the nature of television operations, these principles become realities. Another qualification comes through the number and kinds of equipment in service. A broad approach to total maintenance required (in terms of personnel) for technical equipment stretches from 20% to 50% of total personnel time for maintenance. Few educational television operations extend beyond a token of the work day (8 hour reference). As a result, the number of people required for operational activity can be diverted to maintenance after completion of the short periods of operation.

12. WHAT INSTALLATIONS SEEM TO BE MAKING MOST EXTENSIVE AND/OR EFFECTIVE USE OF LEASE ARRANGEMENTS FOR EQUIPMENT RATHER THAN PURCHASE?

a. Anaheim Public Schools, Anaheim, California.

b. Washington County Schools, Hagerstown, Maryland.

c. South Carolina State Educational TV Network.

d. Galveston, Texas (Phonovision experiment. This operation was not visited personally but reports indicate high interest and enthusiasm).

Many educators have the opinion that the cheapest way to operate is to own equipment. It is important to add costs of amortization, obsolescence, general maintenance, personnel, equipment for testing etc., property purchases, liabilities and other hidden costs. The acquisition of capable personnel is a costly factor, and to retain their services over long periods of time are liabilities often underestimated or forgotten. When these are considered realistically, leased services become quite attractive.